

birmingham archaeology



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Tutbury Castle, Staffordshire,
A Programme of Archaeological Work
2006



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TUTBURY CASTLE, STAFFORDSHIRE

A PROGRAMME OF ARCHAEOLOGICAL WORK, 2006

Summary

A third season of archaeological work was carried out at Tutbury Castle, Staffordshire as part of a wider research project in collaboration with the British Museum and Tutbury Castle. The survey work included a resistivity survey of the outer bailey, GPR surveys of the middle and outer baileys and completion of the topographical survey of the castle hill and its earthworks. In addition, there were several excavation foci, Area 1 being located to the west of the chapel, Area 2 between the North and South towers, and Area 3 on the motte.

An 8m square area was opened to the west of the chapel and selectively excavated to a maximum depth of 1.06m below ground level. The excavation revealed a sequence of silty clay layers, making up what appeared to be, in its later stages, an open area. Roughly in the centre of the excavated area, built on a base of tightly packed cobbles, was a low rectangular structure constructed of two courses of coursed and dressed masonry, apparently reused, with a chamfer around the upper edge. The general appearance of the structure was similar to that of a sepulchral raised slab, but the feature is tentatively interpreted here as a plinth for a monument of some kind. Other aspects of interest included a possible hearth and surrounding burnt area, and, just within the northwest corner of the excavated area, a rubble foundation, probably a plinth for a timber-framed building. Most of the features are likely to be of post-medieval date.

Two trenches were excavated in Area 2, one to the north of the South Tower (Area 2a), and one to the southwest of the North Tower (Area 2b). Area 2a was a re-opening of the trench partially excavated in this area in 2005, which had uncovered the top of a sequence of waterlogged layers (Martin-Bacon and Kincey 2006); work during the 2006 season involved the excavation of those layers. The natural subsoil was reached at a depth of approximately 2m, and at the northwest end of the trench, towards the bailey, the edge of a large feature was discovered which was tentatively identified as a ditch. This opens the way for a reinterpretation of the character of the early castle. The ditch was filled, and the adjacent berm covered with organic material including large amounts of birch bark and wood, containing a quantity of pieces of leather, both primary and secondary off cuts and shoe fragments, all of which appeared to have been deposited during the late 11th to 12th century. This whole collection of material suggested that both tanning and manufacture of leather artefacts had been carried on at the site at an early period and that the debris from these processes had been deposited within the inner ward.

The purpose of excavating in Area 2b, which lay immediately southwest of the 2005 excavation (Martin-Bacon and Kincey 2006) was to uncover more of the building revealed in the 2004 and 2005 seasons and tentatively identified as the lodging that Mary Queen of Scots was accommodated in during her incarceration here in the 1580s. More of the west wall of this building was recorded, which was progressively less well-preserved as it extended southwards, eventually disappearing before being

picked up again in a test pit beyond the main trench. Towards the northern end of the building, part of a western projection was excavated, which was interpreted as a porch. The foundation stones of this former timber-framed building sat on a red clay layer containing 13th-century pottery, and although the date of the building itself is uncertain, a mid-17th-century destruction layer that sealed the walls seems to provide a terminus ante quem.

Two trenches were opened in Area 3, one on the north side of the motte (3a), immediately northeast of the 2005 trench, and one on the southeast side (3b). Area 3a contained a mass of stone which appeared to represent the conjunction of two sections of walling forming the corner of an ashlar-faced structure, apparently the perimeter wall around the top of the motte, that appears on 16th-century drawings. Much of the rubble core immediately behind these facing stones had been robbed, but in those areas that had survived intact, the top surface of the wall survived as a flat stone pavement, which seemed to represent a wall walk or allure. No significant structures or features were discovered in Area 3b

1.0 Introduction

A third season of archaeological work was carried out at Tutbury Castle, Staffordshire over the three-week period 30 May-16 June. The archaeological programme was centred around a training excavation for first and second year undergraduates from the Institute of Archaeology and Antiquity, University of Birmingham, and included excavation, as well as geophysical and topographical survey. The archaeological project was instigated in 2004 by Mrs Lesley Smith, the lessee of Tutbury Castle, as part of a wider research programme on the castle and town being co-ordinated by Dr Gareth Williams of the British Museum. The professional direction and supervision of the archaeological fieldwork was undertaken by Birmingham Archaeology with input from the British Museum.

2.0 Site Location

Tutbury Castle is situated on the northern edge of the town of Tutbury, East Staffordshire at NGR SK20952915. It lies on the south side of the River Dove, which forms the county boundary with Derbyshire (Fig. 1).

3.0 Objectives

Objectives for 2006 were as follows:-

3.1 Non-Invasive Survey Objectives

The 2006 survey work was undertaken to extend the geophysical and topographical surveys carried out in the previous two field seasons (see Barratt and Hislop 2004, and Martin-Bacon and Kincey 2006). The primary objectives were, therefore, to conduct a resistivity survey of the outer bailey, a ground-penetrating radar survey of both the middle and outer baileys, and to complete the topographic survey of the castle earthworks. It was hoped that the geophysical surveys would help identify the nature and extent of any further archaeological remains in the outer baileys of the castle. The completion of the earthwork survey was intended to provide a useful topographic model of the castle to aid the interpretation of its form, layout and construction, as well as to provide a landscape context for the results from the various excavation areas and geophysical surveys.

3.2 Excavation Objectives

Three areas were targeted, two in the inner bailey (Areas 1 and 2) and the other on the motte (Area 3).

Area 1

Area 1 was an 8m by 8m trench situated to the west of the chapel, where the results of the geophysical survey were consistent with below-ground disturbance. The area was designed to specifically target anomalies with distinct form and structure, in order to confirm or refute their tentative interpretation as the remains of buildings.

Area 2A

Area 2A was designed to expand the understanding of the area west of the South Tower. The 2005 Season (Martin-Bacon and Kincey 2006) discovered organic deposits at a depth of c. 2-2.5m below ground surface in a narrow trench (Area 2), 2m x 5m in size. The intention was to expand the trench to the north-west and to excavate to the depth of the organic remains using a JCB excavator. This was intended to expose a greater area of the organic material to identify structures and establish the nature of the remains.

Areas 2B-E

Area 2B was located c. 20m to the north of area 2A, to the southwest of the North Tower. The intention of the 2006 excavation was to expand the area excavated during the 2004 and 2005 seasons (Area 1), which had uncovered the northern end of an apparently rectangular structure with stone/rubble foundations. The intention of the 2006 season was to establish the extent of the building further to the south by the excavation of a 10m x 2m trench (Area 2B) was excavated adjacent to the 2005 Area 1. The main trench was to be supplemented by a series of targeted trenches designed to establish the continuation of the rubble wall remains (Areas 2C-E).

Area 3A

The purpose of Area 3A was to extend the trench excavated in 2005 (Area 3) in order to recover more evidence for the interpretation of the stone structures located there.

Area 3B

Area 3B was a speculative trench designed to investigate a flat area on the side of the motte.

4.0 Non-Invasive Survey by Mark Kincey

4.1 Survey Control

Methodology

In order for a new survey control network to be established on the site it was necessary to create a new base station point. A location on top of the motte was again selected and a short-stem earth anchor used to mark the permanent station. The primary survey was carried out using the Leica System 500 GPS. This equipment incorporates Differential GPS with Real-Time Kinematic survey to provide data to an accuracy of $\pm 0.02\text{m}$, therefore within the precision range specified by English Heritage for survey control networks (Lunnon 2000, 2.1.1). The GPS base station was set up on the new permanent survey point and allowed to calculate its position over a period of a day by receiving signals from the orbiting satellites visible during that period. The base data were imported into the Leica SKI-Pro software, along with the relevant Receiver INdependent EXchange (RINEX) Format data downloaded from the Ordnance Survey active GPS network. SKI-Pro was then used to process the RINEX and base station data together to provide a corrected positional location. The processed data were converted into the Ordnance Survey Great Britain

(OSGB)/Ordnance Datum Newlyn (ODN) coordinate system, providing the base station coordinates in the standard easting, northing and orthometric height format used in British mapping.

With the corrected position of the base station established, a secondary control network could next be laid out. A series of ten temporary control stations were positioned across the inner bailey, as well as four others located in the southern stretch of moat. These stations were positioned to provide intervisibility between the points in order to allow the use of optical surveying equipment such as Dumpy Levels and EDMs. A combination of Differential GPS and optical surveying techniques were then used for the positioning of the excavation trenches, and for the recording of levels within the trenches.

4.2 Resistivity Survey

Methodology

The resistivity survey was carried out over a series of fourteen 20m x 20m grids covering the outer bailey of the castle (Fig. 2). However, the presence of a metalled car parking area to the northwest of the survey area, combined with the curving field boundary to the east, meant that six of these grids were only partially covered by the geophysical technique. Where possible, the survey was extended as far as the field boundary itself to provide maximum coverage. The grid locations were initially established in the project GIS to allow the alignment of the maximum number of complete grid-squares within the irregular field boundary. Once created, the coordinates of these grid corner points were uploaded onto a Leica GPS500 as .txt files, and the Differential GPS unit used in the field to 'stake-out' the various point locations with temporary plastic pegs. This provided the geographical positioning of the grid intersections to an accuracy of $\pm 0.02\text{m}$ and therefore within the accuracy range specified by English Heritage for geophysical surveys (David 1995, 4). Each peg was labelled with a number relating to the GIS plot and marked with a bamboo cane, to assist the relocation of the points during the survey period.

The survey was carried out using a Geoscan RM15 resistance meter connected in the twin probe configuration and with a mobile electrode separation of 0.5 m. Data were collected at sample intervals of 0.5m along SE-NW traverses spaced 1m apart, using marked ropes for guidance. The traverses were collected in a zig-zag pattern rather than uni-directional due to time constraints and the relatively large survey area.

The data were downloaded into the Geoplot software and a composite of all the individual grids created. The overall dataset was processed to remove any anomalous readings that are inherent in most resistivity surveys and to emphasise the archaeological features from within the background geological 'noise'. This processing followed standard procedures and included clipping, despiking, edge matching between grids and filtering. Low- and high-pass filters were independently applied to the data to respectively analyse the results with the high frequency small-scale spatial detail removed, as well as with the low frequency background noise omitted. The processed greyscale images were then exported into ArcGIS and georeferenced to the corrected grid points recorded with the GPS unit. New shapefiles were created in the

GIS to digitise the various high and low resistance features visible within the processed data, providing the basis for the interpretation plots.

Results and Interpretation

The resistivity survey of the outer bailey has highlighted a series of anomalies requiring further investigation. The results of the survey are shown in figs 3-7, with the numbered features referred to in the following text being visible on Fig. 7. Perhaps the most intriguing result from this geophysical technique is the large, roughly circular high resistance feature (Feature 1) in the central section of the survey area (centred on NGR: 421064, 329173). This feature measures approximately 23 m in diameter, with the high resistance ring itself measuring between 0.5-1 m in width. The resistance values are markedly higher than those around it and are suggestive of some form of buried compacted material, such as a masonry wall. Several other anomalies are visible both within the bounds of this high resistance circuit and directly around it. A broad irregular spread of low resistance (Feature 2) is identifiable extending from the centre of the circuit to its northern segment, measuring c. 14 x 12m. This low resistance spread is bounded to the west by a spread of high resistance values of a similar size (Feature 3). This high resistance spread appears to extend either side of the western arc of the circular anomaly, therefore possibly representing a feature relating to a different phase or function. The southern interior section of the circular feature contains a series of narrow linear high resistance features, possibly the remnants of walls (?) or associated internal features. To the east of the interior of the circular feature is a high resistance, figure-of-eight shaped anomaly (Feature 4). This feature appears to extend as far as the eastern arc of the circuit but not to continue any further than this, suggesting that it is directly associated with the circuit itself. The feature forms two cell-like areas, with the northern cell measuring c. 4 m in diameter, and the southern being slightly larger at c. 5 m in diameter. The cells are surrounded by an amorphous spread of high resistance values.

Although a slight topographic rise is discernible at the location of the features, there are no other obvious clues on the ground as to their origin. The complete absence of the feature on any of the 19th-century Ordnance Survey or estate/tithe maps analysed for this work, does suggest that the feature probably at least predates this time but additional, invasive work is almost certainly required to further inform any interpretations.

Further to the north of the circular feature is a group of other notable features which, based on their location and orientation, could plausibly be associated. A linear high resistance feature (Feature 5), aligned roughly north-south and measuring 13.5 m in length and 1.5 m in width, extends between 421053,329218 and 421058,329205. This feature is clearly defined with straight edges and appears to show the presence of some form of buried compacted material, possibly a wall. To the south of this a broader spread of high resistance values appears to show the continuation of the linear feature, although with a far less clearly defined outline (Feature 6). This irregular spread of high resistance extends for approximately 20 m along the same alignment as the aforementioned linear, until it meets the circular feature outlined above. The linear feature and the spread are both bounded by a large amorphous background of high resistance readings, suggesting considerable sub-surface remains/disturbance. Although it is unclear without excavation, it is possible that these two anomalies are

associated and form a continuous feature, or set of features, leading up to the circular anomaly. Further investigations are of course again required to clarify the nature of these buried features.

To the west of the survey area a number of other features, both high and low resistance, were located. A high resistance linear feature (wall?) measuring 18 m extends northeast-southwest between 421042,329197 and 421028,329185 (Feature 7). To the south of this linear is a cluster of low resistance anomalies centred on 421040,329188, bounded to the west by a clearly defined rectilinear high resistance feature (Feature 8). This rectilinear feature measures approximately 6 x 5.5 m and is also orientated northeast-southwest. Further to the west are a series of other, less clearly defined features of possible archaeological origin. It is unclear from the resistance survey whether these features are associated but this location would be another suitable focus for future investigations.

Although the survey area was extended as far as the perimeter fence, few features were located within a band of approximately 10 m in from the edge of the bailey. Apart from an irregular high resistance feature to the far southwest of the bailey (centred on 421036,329137), the rest of this widespread band was, however, notable for displaying much lower resistance values. The cause of this low resistance background in these areas is probably a combination of the vegetation around the bailey and the weather conditions in the weeks prior to the survey. The perimeter fence is marked by a line of trees to the south and east, and tall grasses to the north. This vegetation provided shade for the area immediately inside the bailey for considerable portions of the day, keeping the areas close to the field boundary cooler than the centre of the bailey. There had been several weeks of hot, dry weather prior to the field survey, with intermittent heavy rain during the resistivity data collection. It appears likely that the low resistance readings close to the perimeter fence therefore reflect areas where the topsoil had been allowed to retain the moisture from the recent rainfall, whereas the centre of the bailey had dried out significantly more due to the lack of shade. As well as explaining the presence of the low resistance band around the bailey, this interpretation also raises the possibility that some archaeological features may well have been obscured by high background disturbance caused by this differential moisture retention. A repeated resistance survey when the field conditions are more suitable may well provide a better understanding of the buried remains of this bailey.

4.3 Ground-Penetrating Radar (GPR) Survey

Methodology

The GPR survey for this season focussed on areas within the middle and outer baileys (Fig. 2). In the outer bailey, the grids laid out for the resistivity survey were used as baselines to facilitate the extension of the GPR transects to cover almost the entire enclosure (an area approximately 80 x 80 m). In the middle bailey an area of 80 x 40 m was surveyed, although with the northwestern corner being omitted due to the irregular boundary of the bailey.

The GPR data were collected with the SIR3000 GPR system manufactured by Geophysical Survey Systems Inc. (GSSI). The survey was carried out using a

400MHz antenna to provide a suitable combination of depth penetration and resolution of results. A calibrated survey wheel was employed for the data collection to ensure that the length of the transects was accurately recorded. Radar scans were carried out along traverses 1 m apart, using measuring tapes and bamboo canes for guidance. For the outer bailey the data were collected along uni-directional parallel transects to prevent any misalignment of adjacent transects. However, time constraints meant that the data for the middle bailey had to be collected along zig-zag transects, although considerable care was taken to maintain alignment to the grid. The sample interval was set to record 512 samples per scan and 100 scans per metre. The range setting was set to 60 nanoseconds, providing a maximum depth of c. 2.6 m, although it should be noted that this is an estimated depth based on an assumed dielectric soil value of 12.

The processing of the radar data was carried out in Radan 6.5 software. The raw traverse (.dzt) files were initially loaded into Radan for a preliminary examination prior to any processing or combining of files. The processing techniques to be applied to the datasets were first tested on several of the profiles individually until suitable parameters were obtained. A macro was created using these processing functions and applied to all of the files within each project. The processing included a time-zero correction, an FIR filter for horizontal background removal, a four-point linear gain alteration and a variable velocity migration. Following processing, the individual profiles were then combined together to form single Radan 3D files which could subsequently be viewed as 3-dimensional cubes, allowing both plan (timeslice) and profile views of the data at varying depths.

Results and Interpretation

Middle Bailey

The GPR survey of the middle bailey appears to have highlighted a number of features of possible archaeological origin, as well as several which are clearly modern. Figs 8 and 9 display the results of the survey in the form of 0.2 m thick timeslices at varying selected depths. Fig. 11 provides a labelled interpretation plot produced from a combination of the results from the different slices. It should be noted that all of the depths mentioned in the following text are only estimated measurements based on the assumed dielectric permittivity of the soil (see GPR methodology above).

Feature **A** represents a rectangular area of reflective responses measuring approximately 16 m x 12 m and visible on the 0.2-0.6 m slices. Although the responses are not as high as many others visible in the survey area, the regularity of form of the feature is clear. At the centre of **A** is an irregular, but stronger, response which appears to show the presence of a dense reflective material such as masonry or a compacted surface.

Feature **B** is a broader spread of reflective responses visible between 0.2 m and 1.2 m from the ground surface. Although there is not a clear definition to this area, it contains a number of well-defined features within it. Feature **C** is the clearest response on the GPR survey results. This feature is visible from the ground surface and displays the response of the GPR to the modern compacted approach road to the

castle. Likewise, feature **D** which is located to the southwest of the survey area, is modern in origin, showing the response obtained from the edge of the bordered playground area.

Feature **E** is visible on the 0.55-0.8 timeslices and highlights a relatively flat reflective surface, such as masonry. This feature measures roughly 4 m x 3 m and is situated on the southern edge of the broad spread **B**. Without further investigation it is unclear whether the feature is archaeological or simply reflects a localised natural change in the soil stratigraphy.

Feature **F**, however, is far more convincingly archaeological in origin (figure 10). This feature is a roughly circular set of responses measuring over 12 m in diameter and approximately 2 m in width. The response appears at a depth of 0.55 m and is lost at around 1.0 m with the attenuation of the GPR signal. The outline of the feature is marked in profile by a clear hyperbolic response, with the interior displaying a regular surface response sloping gradually down to the south. This surface possibly continues beyond the southern extent of the feature as displayed on the interpretation plot, although the general background noise in this location obscures the clarity of the anomaly.

Features **G** and **H** are located to the northeast of the survey area, and are more difficult to interpret. Feature **G** is a point reflector which is visible from the surface of the cube down to the base. The shape and clarity of the feature suggests it may be modern but nothing was noted as visible during the fieldwork and further investigations are therefore necessary. Feature **H** is a poorly defined irregular anomaly stretching for almost 7 metres from the northwestern edge of the survey area. In profile this feature appears as a surface response with numerous separate reflectors. This response is possibly indicative of an irregular compacted material such as rubble but the outline of the feature is poor and therefore this cannot be substantiated.

Below a depth of approximately 1.5 m the GPR results for the middle bailey become largely obscured by the attenuation of the radar signal. This problem is inherent on many GPR surveys in Britain due to the relatively high clay content of many soils, precluding the collection of meaningful data at certain depths (Gaffney and Gater 2003, 48).

Outer Bailey

The GPR survey of the outer bailey of the castle has also highlighted a number of features of possible archaeological origin. Figs 12 and 13 display the results of the survey in the form of 0.2 m thick timeslices at varying selected depths. Fig. 15 provides an interpretation plot produced from a combination of the results from the different slices. It should again be noted that all of the depths mentioned in the following text are only estimated measurements based on the assumed dielectric permittivity of the soil.

The linear features **A** and **B** indicated on the interpretation plot are both visible in plan form between a depth of 0.1 m and 0.25 m. The location and shallow depth of these features, along with their appearance in profile as narrow reflectors, suggests that they may be modern in origin. Both features appear to be orientated towards the castle

ticket booth and wash facilities located in the north of the outer bailey. It is therefore possible that they may represent modern pipe utilities. Equally, feature **C**, the 20 m long curving linear response visible in the 0.1 m-0.2 m deep timeslice, may well be the result of this section of the bailey previously being used as a turning circle for vehicles visiting the castle.

Feature **D** is a linear response extending for over 26 m in a southeast-northwest orientation, visible at a depth of 0.7 m. In profile this anomaly appears as a clear, narrow reflector, similar in form to features **A** and **B**. Although it is possible that this feature is modern, it is significantly deeper than the other two probable utility responses and may therefore be deserving of further investigation.

Features **E** and **F** are more extensive spreads of activity highlighted by the GPR survey, which are clearly visible on the timeslices but which lack any obvious definition. Feature **E** is an arc of responses which follow the northern and north-eastern field boundaries of the bailey for a length of over 50 m and a maximum width of 8 m. The feature probably relates to the change of vegetation which occurs close to the edge of the field, both due to the contact problems caused by the longer grass and also the changes the differential drainage may cause to the subsoil strata. Feature **F** is a more irregular spread of differing reflective responses measuring over 50 m in diameter and located towards the middle of the bailey. This spread contains numerous features of probable archaeological origin which are outlined below.

Feature **G** is a curving response measuring 16 m in length and 1.2 m in width, visible at a depth of 0.3 m - 0.45 m. In profile this anomaly appears as a poorly defined hyperbolic response which may reflect a compacted feature such as a curving wall. A similarly shaped, although considerably smaller feature, is located at **H**. This feature measures almost 10 m in length and again appears as a poorly defined line of hyperbolae in profile. Although these features could plausibly be archaeological, their lack of clarity means that further investigation is required to verify their origin.

The features clustered around **I** were identified between depths of 0.4 m - 0.7 m and are more convincingly archaeological in origin. A broadly north-south response meets an east-west feature at a clear right-angle, with a larger, irregular reflector located just to the northwest. In profile these features appear as hyperbolic reflectors, although with a broadly flat surface response extending between them. The linear features themselves are suggestive of compacted, but well-defined, features such as walls, whereas the flat reflective response between could conceivably be a man-made surface such as a floor or yard. This interpretation receives more support from the presence of another cluster of similar features located just to the south at **J**. Visible at a depth of 0.4 m - 0.8 m, these anomalies comprise a large curvilinear response with its apex to the west, bounded by a broadly rectilinear feature measuring 7 m x 8 m, approximately 1 m further west (Fig. 14). The curvilinear feature appears as a clearly defined response, suggestive of walling. A relatively irregular, undulating surface response also extends across all of the elements of **J**. The multiple reflectors creating the irregular nature of the surface could possibly indicate an accumulation of rubble or debris. The location and arrangement of the features at **I** and **J** appear to be the most promising GPR responses archaeologically, although invasive work will be required to verify this.

To the southwest of the survey area is a fairly regular anomaly, **K**, measuring approximately 8x6m. This feature appears at a depth of approximately 1.0m and can be traced, at least partially, down to the 1.6 m timeslice. The feature is obscured to the east by the background 'noise' recorded along the baseline grid edge (see below) and more investigations are again required to clarify its full form. Also only partially revealed was the feature at **L**, located to the far west of the survey area. This feature appears as a semi-circular anomaly at a depth of 0.7 m, visible as a reflective surface sloping gradually down towards the east. Unfortunately the feature was only partially covered by the survey area and the full outline form is therefore unknown.

The majority of the features outlined above are from the upper 1 m - 1.5 m of the GPR cube. There are two main possible reasons for this relative lack of features occurring with depth. The first conclusion could simply be that this distribution reflects reality, with there being little archaeological activity below the estimated 1 m - 1.5 m timeslices. However, there are a number of reasons to believe that the GPR slices may only be providing useful data down to this depth and that any archaeological features lower than this have simply not been picked up. From the 1.6 m slice downwards there are clearly visible, strong linear responses being displayed on the results of the GPR survey, forming a grid pattern across the survey area. When the survey grid is overlain on the GPR results in the GIS it is apparent that these features clearly follow the edges of the grid, therefore reflecting on-site data collection rather than archaeology. The only large linear response that does not match the grid lines is situated in the second row of grids from the north. This response does, however, follow the line of data collection and appears to represent an automatic gain adjustment by the radar along one of the transects, possibly following a battery change. These linear features have obscured large portions of the survey area, making further interpretations at these depths problematic. A further contributing factor appears to relate to the attenuation of the GPR signal at depths below 1.3 m - 1.5 m, visible on the GPR profiles from the survey.

4.4 Comparison of Geophysical Techniques

Although different geophysical techniques examine varying properties of the sub-surface environment, a comparison of datasets from different techniques can provide valuable further information relating to the buried archaeology. The results of the resistivity and GPR surveys of the middle and outer baileys are shown as overlays on figs 16 and 17. Although there are certain features which are clearly visible on both datasets, there is also a considerable amount of disagreement between the results, reinforcing the opinion that, where possible, more than one geophysical technique should be employed to investigate a site. As before, the letters in the text refer to the GPR features, whereas the numbers refer to the resistivity survey features.

Middle Bailey

The GPR survey of the middle bailey did not cover as extensive an area as the 2005 resistivity survey of the same field (see Martin-Bacon and Kincey 2006). On the whole the datasets do not provide complementary evidence, with none of the GPR features except for **A** being visible on the resistivity results (Fig. 16). However, it should be considered that the resistivity results for the middle bailey were somewhat disappointing, possibly due to the wide range of data values caused by the modern

features close to the gatehouse, which seemingly obscured the detail in the rest of the field. It should also be noted that since the two techniques are analysing differing soil properties, this discrepancy is not necessarily unusual.

Nevertheless, there was a certain amount of correspondence between GPR feature **A** and two elongated areas of high resistance in the centre of the bailey. Feature **A** was a rectilinear response suggestive of buried masonry or a compacted surface and therefore complements the high resistance nature of the resistivity response. Interestingly, a roughly rectilinear feature was tentatively identified at this location through parchmarks visible on an aerial photograph examined as part of the 2004 season (Barratt and Hislop 2004, 4.1). It is also worth noting that a rectilinear stable block is recorded in this area on a plan of the castle in the Sadler papers in the British Library, dating from *c.* 1585 (*BL Add Ms 33594, f.175*). This location could consequently be a focus of future archaeological investigations.

Outer Bailey

The correspondence between the GPR and resistivity surveys of the outer bailey appears notably closer than that in the middle bailey (Fig. 17). In general terms the overwhelming majority of the features identified in the resistivity survey lie within the bounds of the GPR feature **F**. This feature is a fairly irregular spread of reflective responses within the GPR cube which is visible down to a depth of approximately 0.6 m (where the feature is lost due to the interruptive noise outlined in the results section). The depth of the feature in the GPR survey is suitable to have been also picked up by the resistivity equipment, as the results suggest.

Although there were numerous anomalies identified within the outline of GPR feature **F** in both the resistivity and radar surveys, there is little actual correlation between individual features. The large circular high resistance feature **1** (possible building) identified in the resistivity survey does appear to have also been partially revealed in the GPR survey. Feature **C** comprises a large curvilinear response which, in plan and profile, is suggestive of a highly reflective feature such as a wall/surface. The curved feature in the GPR is of the correct proportions and shape to be the same response as the western side of the circular feature in the resistivity survey. Even though the responses do not exactly match in the two datasets, they almost certainly reflect the same feature, with the offset probably being due to the difference in what properties each geophysical technique is recording. The agreement between the two techniques in terms of the circular feature strongly promotes this area as deserving of future, invasive investigations.

4.5 Topographical Survey

Methodology

The topographical survey of the inner bailey and middle bailey had been carried out in the 2004 and 2005 field seasons. The focus for this year, therefore, was to extend the ground-based survey to cover the outer bailey, the southern and eastern stretches of moat, and the motte. The survey was carried out using the Leica System 500 Differential GPS unit. The GPS rover unit was set to record in kinematic mode, automatically logging readings every 2 seconds as the earthworks were traversed.

Ranging rods were used to direct the surveyor and separate the survey areas into transects of approximately 5 m, with the spacing being reduced where the topography became more varied and a higher resolution of points was required (as suggested by Barratt *et al* 2000, 138). Once collected, the GPS points were imported into the Leica SKI-Pro software for processing before being exported as comma delimited (.csv) files. These files were then imported into ArcGIS 9 and added to the overall project GIS.

During the survey fieldwork there were several areas of the castle lands that proved either inaccessible or where the GPS signal was blocked by vegetation or buildings. These obstacles were especially prominent on the northern and western slopes of the motte, the southern slope of the southern stretch of moat and the slopes of Castle Hill itself. Time constraints meant that an optical survey using an EDM was not a feasible means of completing the topographical survey and it was therefore decided to incorporate elevation values obtained from the Environment Agency LiDAR (an acronym for LIght Detection And Ranging) coverage of the area. The LiDAR data used for this work was initially provided in the form of a regular grid of elevation values which had been created from the original EA point cloud. In order to combine the ground-based GPS survey points with the LiDAR data to create a comprehensive Digital Terrain Model (DTM), a new point shapefile was imported into ArcMap. The GPS point file was displayed above the LiDAR image to show where the main gaps in the data collection had occurred and new points were then manually digitised at these locations. Care was taken to avoid creating points over areas of woodland or buildings which could have significantly altered the final elevation values. Points were digitised at the aforementioned locations around the castle where GPS satellite lock proved unavailable and a string of new points was also produced extending around the base of Castle Hill, where the slope met the floodplain of the Dove. The digitised points initially had no coordinate values associated with them and so the XY (easting and northing) data was added to the attribute table of the file, along with elevation values based on the location of the points in relation to the LiDAR grid. This process created a point file with XYZ values which could then be combined with the XYZ point file from the ground-based GPS survey to provide a single overall spread of elevation values (Figs 18 and 19).

Several methods were employed to create DTM surfaces from the data, involving the use of various interpolation functions within ArcGIS (namely Kriging, Spline and Inverse Distance Weighted). The method which proved the most successful, however, was to export the full point file to Surfer 8 software and to produce a surface model using the grid data function based on a Krige interpolation (Fig. 20). This grid file was then re-imported into ArcMap for display and further analysis. The surface model was finally imported into ArcScene, the 3-dimensional interface of ArcGIS (Fig. 21). This software allowed the DTM to be viewed in 3D and for various other forms of spatial data to be draped over the top, including images such as geophysics results, aerial photography and historic mapping, as well as vector data such as trench locations and extruded building plans (Fig. 22). Both 2D screenshots and 3D animations were exported from ArcScene to allow the dissemination of the results of the topographic survey (see accompanying CD for examples of project output).

5.0 Excavation

5.1 Method

All stratigraphic sequences were recorded, even where no archaeology was present. Features were planned at a scale of 1:20 or 1:50, and sections were drawn through all cut features and significant vertical stratigraphy at a scale of 1:10. A comprehensive written record was maintained using a continuous numbered context system on *pro-forma* context and feature cards. Written records and scale plans were supplemented by photographs using monochrome and colour print film and high resolution colour digital photography.

Twenty litre soil samples were taken from datable archaeological features for the recovery of charred plant remains. The environmental sampling policy followed the guidelines contained in the *Birmingham Archaeology Guide to On-Site Environmental Sampling*. Recovered finds were cleaned, marked and remedial conservation work was undertaken as necessary. Treatment of all finds conformed to guidance contained within '*A strategy for the care and investigation of finds*' published by English Heritage (1995).

The full site archive includes all artefactual and/or ecofactual remains recovered from the site. The site archive will be prepared according to guidelines set down in Appendix 3 of *Management of Archaeology Projects* (English Heritage, 1991), the *Guidelines for the Preparation of Excavation Archives for Long-term Storage* (UKIC, 1990) and *Standards in the Museum Care of Archaeological Collections* (Museum and Art Galleries Commission, 1992). Finds and the paper archive will be deposited with an appropriate repository subject to permission from the landowner.

5.2 Area 1 by Emily Hamilton

Methodology

Area 1 measured 8m by 8m. The topsoil and subsequent layers were removed by hand. The area was divided into quadrants after the initial removal of the topsoil (5000) and the subsequent underlying layer (5001), and the focus of excavation was centred on the north-west and south-east quadrants. The two remaining quadrants were left *in-situ*. Detailed excavation was carried out around specific identified archaeological features;

- A sondage was dug adjacent to and around stone structure 5007.
- A 2m x 1m sondage was excavated in the north-west corner to determine the depth and extent of wall 5004.
- A 4m x 1.8m sondage was excavated in the south-east corner to assess the potential of deeper archaeology.
- A 1m x 0.5m sondage was dug against the north section to determine the stratigraphy below layer 5002.

Results (Fig. 24)

The earliest deposits were identified in the centre of the trench around stone constructed feature (5007) (Plate 1). This consisted of a base of tightly packed cobbles (5028) overlain by a stepped plinth-like structure, constructed of two courses of squared and dressed sandstone blocks, the upper course with chamfered edges angled to 45°, 1.90m long (N-S) by 0.90m wide (E-W). Pottery recovered from within the fabric of the structure dated from the 12th-to-13th-centuries.

A series of layers had been built up around the feature, the earliest of which was a brown silty-clay (5011) containing two sherds of 12th-century pottery and a bone die (Fig. 32, Plate 16). 5011 was sealed by a grey-brown silt-sand-clay (5010), above which was an orange-red silty-sand layer (5009). Equivalent to these layers were a mid brown clay layer (5032), which was overlaid by a dark brown sand silt clay layer (5033), itself sealed by an orange brown clay sand (5031). To the southwest, a dark brown silt-sand-clay layer (5012) produced a large amount of animal bone. At the southeast corner of 5007, a post hole (5022) cut layers 5009 and 5031. A second post hole (5021), situated at the southwest corner, cut 5031 and 5012.

In the south-eastern corner of Area 1 was a heat-affected red sand layer (5017) within which was a small burnt sandstone structure, containing degraded limestone 5019 (Plate 3). Areas of charcoal (5018) sealed 5017 and it was abutted by orange brown sandy clay (5020).

The earliest deposit recorded in the northern sondage was a compact red sandy-clay (5013), with frequent small pebbles throughout. Sealing this layer was deposit 5012, which was sealed in turn by 5016.

The earliest layer in the north-western area was dark-brown silty-clay layer 5027, sealed by a red-brown silty-clay layer (5026). This was sealed by orange-red sandy-silt clay layer (5025) that was cut by a small pit or large posthole (5030). Overlying this was a red-orange silty-clay deposit 5016, sealed by mid-to-dark-grey silty-clay (5015).

An orange-brown silty-sand with frequent gravel inclusions (5002), containing early to mid-17th-century pottery, overlay the entirety of the trench, above which was a cobbled surface (5005) in the northwest corner and a possible stone surface (5006) in the southeast quadrant.

5002 was also cut by a foundation trench (5029) for a wall (5004) (Plate 2), which ran approximately north – south across the northwest corner of the trench for c.2m, and which was only partially within the excavated area. It consisted of rough cobble and rubble block foundations, overlain by a single course of faced soft alabaster, c.0.60m deep. This wall was sealed by a grey-brown silty-clay (5003) from which three sherds of late 16th to mid-17th-century Cistercian ware was recovered.

Sealing 5002, and present across the whole area was a demolition layer 5001 that produced brick and tile fragments, animal bones, glass and a large quantity of post-medieval ceramics, predominantly of mid to late 17th-century date. Modern topsoil and turf (5000) sealed 5001. 19th and 20th century items including coins (dated to the mid-19th century, mid 1940s and 1970s) were identified from this context.

Discussion

The purpose of the dressed stone structure 5007 was unclear. The upper two courses above the rubble base 5028 had clear aesthetic appeal. Although initial speculation included a grave cover, the size and subsequent excavated results did nothing to support or disprove this theory. The feature was also clearly isolated from any adjacent walls making it unlikely to have been a structural element of a building. It therefore seems likely that it was the footing for a decorative feature such as a statue. The pottery from within the structure provides a 12th- century *terminus post quem*. This layer also produced a bone die, probably of medieval date. Postholes 5021 and 5022 may have been associated with 5007 but the exact relationship between them, if one exists, is unclear.

Layers 5009 and 5010 are probably levelling layers and possibly correlate with layers 5013, 5012 and 5016 (earliest to latest) that were identified in the sondage against the northern baulk. Contexts 5032, 5033 and 5031 may be backfill deposits of an earlier feature truncated by postholes 5022 and 5021.

An area of heat-affected sand and stones (5017) and a charcoal layer (5018) were associated with stone feature 5019. Layer 5020 was contemporary with 5017 and formed part of the same layer prior to exposure to heat. The area of heat-affected deposits was localised to a small area in the vicinity of structure 5019, thus suggesting a hearth or oven. No artefacts were recovered from this area, making it difficult to accurately date this section of the trench. Layer 5002, which covered the hearth 5019, can be dated to somewhere between the 13th and 16th centuries. The earliest deposits date from the 12th to 13th century, and the later deposits, including 5001, date from the post-medieval period allowing only a broad stratigraphic chronology.

Layer 5002 appeared to act as a surface with cobbled layer 5005, and stone surface 5006 above. The presence of the cobbles suggested a pathway, road surface or courtyard. The compact nature of the layer 5002 immediately below the cobbles suggested heavy usage. It is possible that layer 5002 was the ground level in the inner bailey area prior to a period of demolition and subsequent landscaping that occurred after the Civil War.

Although 5002 surrounded feature 5007, it respected, and did not seal it, which indicates that 5007 was *in situ* and exposed when 5002 was deposited. It may be speculated that 5007 was a central feature in a cobbled area at this later period.

Wall 5004 was constructed using alabaster blocks, placed within construction cut 5029, on a bed of rubble as a foundation layer. Alabaster would not have the structural strength to withstand the weight of a stone structure, so it is probable that if the wall was intended to be structural, it carried a timber-framed building and the wall acted as a plinth. Wall 5004 was stratigraphically later than layer 5002 suggesting that it was a post-medieval structure.

Layer 5001, appeared to represent a period of demolition and levelling post-dating the Civil War.

5.3 Area 2 by Christopher Hewitson

Area 2a

Methodology

The trench was 6.8m (northwest-southeast) x 4m (northeast-southwest) and was initially machine-excavated to a depth of 1.8m. This included a 1m wide batter on both the northeast and southwest sides of the trench for reasons of health and safety. The central 2m width was excavated by hand to natural subsoil levels in two separate locations on the northwest and southeast sides of the trench divided by a central spit of unexcavated soil.

Results (Fig. 25, Plate 6)

The natural subsoil was located at a depth of 2.02m below ground level. It was a compact grey-red sand-silt (6509). It was excavated in a sondage to a depth of 0.6m and sampled. A natural interface of light grey sand-silt (6508) separated 6509 from the waterlogged levels above (Plate 4).

At the northwest end of the trench the natural subsoil was cut by a large feature (6512) (Plate 5), with an irregular profile, which was a minimum of 1.45m in width and over 0.65m deep and which extended beyond the limits of the area. Several organic layers filled this. The lowest (6511) was dark-brown silt containing birch bark, semi-decomposed wood and bone. This was overlain by a grey-brown sand-silt (6510) containing similar organic material including birch bark, and was in turn sealed by a c. 0.3m deep organic layer of grey-black silt (6507) containing 12th-century pottery.

At the southeast end of the trench the lowest layer (6506) comprised a greyish black silt containing a considerable amounts of birch bark chippings, semi-decomposed birch wood, bone and late 11th- to early 12th-century pottery. Overlying this was a layer of deposited wood (6505) predominantly semi-decomposed birch bark and wood, c.0.10m thick, containing 12th-century pottery. This layer appeared to discontinue in the central baulk between the southeastern and northwestern areas of the trench. Overlying the layer was a further organic deposit of grey-black organic-silt (6504) c.0.20m deep, also containing 12th-century pottery.

A 1.10m thick depth of red-orange clay-silt (6503) overlay the organic layers. This contained probable 14th-century ceramics, and was in turn sealed by a mixed destruction layer of brownish-grey silt-clay, containing mortar, brick and tile (6501) which was overlain by a dark-brown organic topsoil (6500).

Discussion

The limited scope of the excavation in 2005 meant that interpretation of the organic layers was restricted. Putative suggestions were that they corresponded with a ditch either predating, or contemporary with the establishment of the Norman Castle. Expansion of the excavation area in 2006 did not, as hoped, provide a clear explanation of the structures that related to the organic layers. Feature 6512 may be interpreted as a ditch but in form appeared to be a wide deep pit. The deposits have

been dated to the 12th century and suggest that the feature was associated with the earliest phase of the castle, possibly part of an earlier boundary ditch that was subsequently filled with waste material when it became disused. Analysis of the resistivity survey from the 2004 season from within the bailey walls strongly suggests a low resistivity anomaly in a north – south orientation to the east of the chapel that may correspond with feature 6512 and relate to a boundary ditch earlier than the present one to the east and south of the inner bailey.

Further analysis of the material contained within the layers suggests that they may relate to industrial processes, specifically leather-working. A quantity of leather in varying states of condition was uncovered, which together with the presence of birch bark, is consistent with the tanning and leather processing industry.

However, the location of such large-scale industry within the confines of the castle is inconsistent with its high status. Therefore these may represent the organic remains of rubbish pits or waste on the outer boundaries of the earlier castle compound. The 12th-century date of the majority of the deposits would be consistent with the earliest period of the castle.

The deep layer of build-up material (6503) may be the result of a widespread raising of the ground levels throughout the castle complex in the early post-medieval period. Although initially the layer appeared to pre-date the South Tower, as it lies below it, examination of the topography suggests the land has been built up throughout the interior of the castle and there is a particularly marked rise from the entrance to the south tower. The red clay-silt layer 6503 is consistently found throughout the castle complex and may be part of a large-scale landscaping exercise that followed the disuse of many of the interior structures in the early-post-medieval period.

Area 2B

Method

Area 2B extended to the south from the 2005 excavation Area 1 (Martin-Bacon and Kincey 2005). A trench 2m x 8m was excavated following the postulated course of the west wall of the structure encountered in 2005. The trench was de-turfed and excavated by hand. A baulk was left in the centre of the trench where an electricity cable for the castle floodlights was encountered.

Results (Figs. 26, 27 and 28, Plate 9)

At the south end of the trench a sondage was excavated to a depth of 0.95m. The lowest layer uncovered was a red-orange-brown clay-sand layer, 6009, flecked with charcoal (Plate 8). Overlying this deposit was a shallow layer of black charcoal/slag-silt (6003), 0.01m deep that was consistent with a burnt layer. Over this was a red-brown sand-silt layer (6002) that was present across the entire area and was encountered elsewhere at a depth of between 0.40-0.65m below ground level. Three sherds of medieval (12th-13th-century) pottery were recovered from this layer, as well as a single sherd of early to mid-17th-century yellow ware.

The masonry walls encountered within the area directly overlay layer 6002 and used it as a base for their construction. At the north end of the trench there was an L-shaped

foundation wall composed of a composite of hand-made red-brick and alabaster with heavily applied lime mortar in between (6004). This corresponded directly with wall 3004 (Martin-Bacon and Kinsey 2006) encountered in the 2005 excavation. It was 0.55m wide, and extended north-south for 0.22m before turning 90° to the west and under the trench section (Plate 7).

To the south was a 1.4m break in the north-south line of the wall, and then a second wall (6005) which also extended at a 90° angle to the west. It was of similar construction with a core of red-grey sandstone blocks, alabaster blocks and hand-made red-brick bonded by lime mortar. It survived to a height of 0.32m having a maximum width of 0.55-0.60m. This ran parallel to the east-west element of wall 6004 for 2.5m before turning to the north to form the fourth side of a square/rectangular structure, at the southwest corner of which was a substantial grey sandstone block.

Abutting 6005 and extending the north-south line of wall 6004 towards the south (Plate 7), was a poorly constructed foundation wall of broken brick and un-worked sandstone and alabaster rubble held together by lime mortar (6006). Its condition gradually deteriorated towards the south and eventually petered out until survival was a mortar stain overlying layer 6002. It survived to a height of 0.25m and was 0.50m wide at its maximum. Survival was visible for c.5m, but it only existed as an upstanding wall for c.3m.

The continuation of the wall was visible c.4m to the south as a small exposed section of compacted mortar with small pieces of sandstone (6007). This continued into the baulk left by the electricity cable and continued beyond as a compacted rubble and mortar wall (6008) surviving to a height of 0.28m.

Overlying the masonry foundations throughout the area was a thick layer of mixed rubble including hand-made red-brick, slate and sandstone infilled with a loose dark brown silt (6001). This ranged in depth from c.0.4-0.55m. Within the fill were substantial quantities of glass and window-lead consistent with destruction debris.

Discussion

The earliest layers found in the sondage at the south end of the trench were consistent with the lower layers encountered in the 2005 season. Layer 3032 was a charcoal-rich thick brown clay into which a pit (3051) was cut that was putatively dated to the 16th century, and appeared consistent with layers 6003/6009. A layer of red-brown sand-silt (3023), dated to the mid-17th century overlay this, which may correspond with layer 6002. These red clay-silt layers may be consistent with the levelling deposits encountered in Area 2A (6506) and may represent levelling prior to the construction of the structure represented by the wall foundations.

These relatively narrow (less than 0.55m and often only 0.35-0.45m) rubble foundations capped by faced and chamfered stonework (as uncovered in the 2004 season) are not consistent with large-scale stone or brick construction, but are far more indicative of a sill for a timber-framed building. The large quantities of bricks encountered within the rubble debris may indicate brick nogging infill panels, although brick is also likely to have been used for the chimney stacks that must have

served the building. The historical evidence suggests the building was a two-storey range and the use of timber-framing would easily accommodate this with a light-weight strong framework.

The walls located within the trench extensions (6004 and 6005) appear to represent a short rectangular structure, probably a porch. A single faced stone adjacent to wall 6004 may represent survival of the door threshold. The presence of window-lead and ceramic tiles appears consistent with a structure that was subsequently destroyed and levelled rapidly.

Area 2C-E

Methodology

A series of three test pits was hand-excavated along the line of the west wall of the structure located in area 2B. Trench 2C was located c.3m to the south of area 2B. It was 3m in length by 1m wide. Areas 2D and 2E were located a further 5m and 10m respectively to the south, both measuring 1m by 1m.

Results

The earliest deposit encountered in Area 2C (Fig. 29, Plate 10) at a depth of 0.58m below present ground level, was a yellow-grey sand-silt layer (6804) that was overlain by a yellow-brown silt layer (6802). A rough construction rubble wall foundation (6803) was built directly on this layer orientated north – south. A dark-brown silt-sand layer (6801) that interfaced with the upper topsoil layer (6800) overlay this. The topsoil itself contained a large amount of early to mid-17th-century pottery with only a few sherds of 19th-century material.

The earliest deposit in area 2D was red-brown silt-clay 6702, located 0.25m below the current ground layer, which contained early to mid-17th-century pottery. Grey-brown silt (6701) and the topsoil layer (6700) overlay this.

In area 2E the earliest deposit encountered was brown-orange silt (6602) at a depth of 0.25m that contained 16th-century pottery. Light yellow-grey silt (6601) and the topsoil (6600) which contained mostly mid-17th-century pottery, overlay this.

Discussion

Although the wall continued into area 2C it did not appear in areas 2D and E. However, the fragmentary nature of the wall remains towards the south of the structure suggest that demolition within this area of the site was more comprehensive and that any remains may have been removed. The overlying layers 6601, 6701 and 6801 correlate to 6001 and represent a widespread period of demolition and levelling associated with the destruction of the building. The destruction layers appear to date to the post-medieval period and may correlate closely with the destruction of the buildings when the castle was rendered untenable after the Civil War.

5.4 Area 3 by Philip Mann

Area 3A

Methodology

The objective in Area 3 was to extend the area excavated in the 2005 season (Martin-Bacon and Kinsey 2006). This was duly expanded to the northwest to incorporate an area of 6.5m (northeast-southwest) by 3.3m (northwest-southeast). Most of the material excavated within the area was back-fill from the 1913 and 1960 excavations on the motte (Hislop and Williams 2006). ¹The only undisturbed deposits that survived were located in the north-west corner of the trench.

Results (Fig. 30, Plate 11)

The north-eastern part of the trench was excavated to a depth of 1.04m at which level a hard red clay layer (7014) was located. This was overlain by a red-brown silty-clay layer (7008) which was 0.28m (northeast) -0.74m (southwest) in depth. These layers were overlaid by a thin band of rubble and stone (7013) which was between 0.12-0.16m deep, which was in turn overlain by a dark brown organic topsoil (7001).

In the southwestern part of the trench, and within the area previously excavated in 1913 and 1960, the remains of a northwest to southeast aligned wall were revealed (7009) measuring 0.69m in width and 0.68m in height (Plate 13). The wall retained three courses of faced sandstone blocks the lowest of which was a splayed plinth which sat upon a large foundation stone (7016) measuring 0.39m in width by 0.56m in height. There was a carved design on the second course of stone facing northeast (Fig. 30, Plate 14). Further to the southwest were the more substantial remains of a wall (7010) measuring 1.14m in width and 1.55m in height (Plate 12). This wall, which consisted of six courses of faced ashlar blocks with fine mortaring between them, extended in a northwest to southeast direction before turning to the southwest. The faced stones on the southwest elevation of the wall showed evidence of tool-marks on certain stones. Between and to the northwest of these walls were rubble surfaces, seemingly representing the wall core (7011 and 7015). The aforementioned structures were all sealed by the backfill of earlier excavations (7007), which in turn was overlain by dark-brown organic topsoil (7001).

Discussion

The various stone elements (7009, 7010, 7011 and 7015) seemed to represent the corner of the wall surrounding the top of the motte (7009) that is shown in two 16th-century drawings, and 7010 appears to incorporate the top of a walkway that would have run along the inside. This would suggest that the curtain wall of the castle was located further to the northwest, and was outside the excavation area. There is little doubt that 7009 and 7010 formed a single structure, and that the rubble core between the two faces of dressed stone had been heavily robbed.

¹ For a summary of earlier excavations see M. Hislop and G. Williams 'The Tutbury Project: An Interim Report', *The Castle Studies Journal* XX (2006/7), 101-143.

Area 3b

Methodology

The trench was excavated by hand to a size of 2m by 6m and orientated east – west perpendicular to the slope of the motte on its eastern side.

Results (Fig. 31)

A hard, red clay (7005) was located at a depth of 0.90m below the ground level, and was overlain by a silty red clay layer (7003), 0.26m in depth (Plate 15). Towards the east of the trench and pressed in to this layer were the remains of a possible floor surface (7006), heavily truncated by the later and overlying thin band of rubble and stone layer (7002) which contained clay pipe and fragments of glass. These contexts were overlain to the southwest of the trench by a dump of alabaster stone of varying sizes (7004). These deposits were overlain by a dark brown organic topsoil and turf (7000).

Discussion

The layers recorded in section of the area, and particularly context 7002, suggested that this lower area of the motte had been artificially raised using rubble and alabaster fragments from an earlier structure and was perhaps associated with the raising of the motte height that immediately preceded the building of the folly between 1780 and 1792 (Hislop and Williams 2006/7, 103). The one feature of note was the possible floor surface (7006) towards the east end of the trench, although this was so heavily truncated by later layers that it was impossible to tell the extent or size of any such surface.

6.0 Finds

6.1 Medieval Pottery *by Stephanie Ratkai*

The small assemblage was very similar to those recovered from the 2004 excavations (TTD04) and from Trench 2 from the 2005 excavations (TTD05). In all cases fabrics Sc01-03 found the majority of the pottery present (see Tables 1 and 2). The presence of unglazed Stamford ware sherds from TUT 06 suggests that the pottery dates from the earliest years of the castle ie the late 11th-early or possibly mid 12th centuries (see Table A for spot-dating). There were cross-joins between 6505 and 6506 and 6504. Glazed gritty ware (grittyw03) sherds found in these contexts and in 6507 may be intrusive but could date to the 12th century. The sherds were small and the presence of other clearly intrusive material (also small sherds) may make the former more likely. Two contexts, 6503 and 6902, appeared to be later. The former contained a rather mixed group of pottery. The earliest comprised SC02-03 sherds, which from their small size and rather worn condition appeared to be residual. The post-medieval coarseware sherd in contrast was probably intrusive. The dating of the context would seem to rest on two large joining sherds (buffw05 – a fabric not hitherto recorded) from a bowl with a large bead rim. The interior was unglazed but the exterior was splashed with olive glaze, the position of which indicated that the bowl had been fired

in an inverted position. Such a firing position is typical of medieval wares. However the overall form of the bowl made it unlikely that it dated to early in the medieval period, so a date in the 15th century is perhaps the most likely. The second context, 6902, contained mainly gritty ware sherds (grittyw02) dating to the 15th or 16th centuries. The presence of a cistercian or blackware sherd may favour a 16th century date or may be intrusive along with the post-medieval coarseware sherd.

The assemblage was dominated by cooking pots, with very few glazed sherds. This would also be consistent with an early date for the assemblage.

In recording the TUT 06 material it became clear that the differences between fabrics SC02 and SC03 (and newly added fabric SC04) were not so well defined as originally thought and a future programme of thin sectioning to test the boundaries of the fabrics should be undertaken.

6.2 Post-Medieval Pottery *by David Barker*

The 2006 season of excavation produced a total of 785 sherds from stratified contexts. During a rapid assessment of the assemblage, these were sorted by type, using established criteria to describe north Staffordshire and related post-medieval ceramics, and sherd counts were made. Decoration was noted, where present, as were the most obvious vessel forms. The level of detail will be refined when a full analysis of the assemblage is undertaken.

The breakdown of sherds by area and context is given in Table 3, together with the date range of the material present. Those contexts which have a small number of sherds of significantly later date are indicated so '+’.

With the exception of the upper layers, contexts [5000], [5001], [6000] and [6001], there are very few sherds which are later in date than the 17th century, although every large context has some small element of later, intrusive, material. These later wares are unexceptional, and typically comprise sherds of creamware, refined blackware, bone china, yellow ware, grey stoneware, blackware and, predominantly, white earthenware.

Area 1

Of all the contexts examined from the 2006 excavations, [5000] alone is exceptional in comprising predominantly 19th-century ceramics, amongst which are at least 63 sherds of unglazed red earthenware plant pots, some of which bear impressed inscriptions or manufacturers’ marks on their exteriors. All but three of the sherds (i.e. 95%) from [5001] date to the mid to late 17th century. The early wares types present include Cistercian ware, black ware, yellow ware, brown salt-glazed stoneware, Midlands purple ware, slipware and tin-glazed earthenware. Two sherds from [5002] are of ‘transitional’ blackware, dating to the early to mid 17th century, while a similarly early date – perhaps late 16th to mid 17th century – is suggested for [5003]. The ceramics from this context comprise a Cistercian ware handle and two joining sherds of a Cistercian ware or transitional blackware vessel, perhaps a cover. Context [5016] contains just two sherds, one of which is of a 19th-century yellow ware; the other, a rim sherd with a well-fired sandy fabric, appears to be of medieval date.

Area 2

Context [6000] comprises a mix of 17th-, 18th- and 19th-century wares with most of the types represented elsewhere.

By contrast, [6001] is a large group (331 sherds) of material which is largely contemporary in date, probably of the mid 17th century. Just 9 sherds (2.7%) are of 19th-century date. The range of ceramics types is typical of the 17th century. The greatest number of sherds belong to black glazed hollow ware forms, cups, jars and perhaps jugs, in Cistercian ware, blackware and transitional blackware. Also present are sherds of yellow ware, Midlands purple ware, coarse earthenware, slipware and Rhenish stoneware.

Context [6600] contains 6 sherds of early to mid 17th-century material, including Midlands purple ware, yellow ware and blackware; a single yellow ware bowl rim is of mid 19th-century date. A single yellow ware dish rim from [6602] is probably of mid 17th-century date. Also of mid (or earlier) 17th-century date are 5 sherds from [6702] which comprise Cistercian ware and Midlands purple ware.

All but 7 of the 45 sherds from [6800] are of 17th-century date. The wares represented include Cistercian ware, blackware, yellow ware, Midlands purple ware, coarse earthenware and two sherds each of slipware and tin-glazed earthenware. A mid 17th-century date seems likely for a context containing this range of material.

One hundred and four (95%) of the 110 sherds from [6801] are probably of early to mid 17th century in date. The types present includes Cistercian ware, yellow ware, Midlands purple ware, coarse earthenware, blackware and a single sherd of Rhenish stoneware. This material appears to be broadly contemporary and the preponderance of Cistercian ware over blackware and the absence of any sherds of slipware, suggest that an early 17th-century date is likely for the majority of the ceramics.

Area 3

Three sherds from [7002] are of 17th- to mid 19th-century date.

Discussion

A range of what can broadly be termed Midlands purple wares is present. These include the heavy forms, such as jars and jugs, in sandy fabrics which vary in colour from light brown to purple. A significant part of a large jug is present in [6801], while a large jar form with a pronounced collar is present in [5001]. Otherwise, the sherds are largely undiagnostic.

Also broadly described as Midlands purple wares are cylindrical 'butter pots', all with some internal lead glaze, in a range of fabric types which vary from the a well-fired orange to an over-fired and reduced purple. This is typical of 17th-century wares of this type. Rims are frequently neatly made to allow a fabric cover to be attached. In the main these wares do not have the appearance of Staffordshire products and, like the more 'standard' Midlands purple wares present in these contexts, they are perhaps

most likely to originate from Ticknall. Certainly the wheel-turned bands of reeding present on a number of these vessels from [6001] and 6600] have been observed on similar vessels from Ticknall.

The problems of distinguishing between some blackwares and Cistercian wares have been discussed in the report on the ceramics from the 2005 excavations (Barker 2005) and need not be reiterated here. A clearer picture of what exactly is present will, however, emerge when a full analysis is undertaken.

Sherds which belong to Cistercian wares are certainly numerous, if generally, rather fragmentary. Distinctive rim forms are present in [6001], some vessels having heavily ribbed bodies. The range of forms would appear to be somewhat wider than those illustrated in the north Staffordshire type series (Barker 1986a). Decorated sherds are present in [5001] and [6001]. Two of these (one from each context) comprise applied white clay pads which have then been stamped with a wheel-type motif. The third [6001] is formed by the application of narrow white clay strips which have then been notched in some way. Both types are typical of Cistercian wares, the later being particularly associated with Cistercian wares from Ticknall (Spavold & Brown 2005)

Where blackware forms can be recognised, they are small three-handled cups (as Barker 1986b, 71 nos. 44-45), which are present in [6001], and large multi-handled cups (as *ibid.*, 73), which occur in both [5001] and [6001]. These are certainly of a type produced in north Staffordshire during the mid to late 17th century, but other production sources cannot be ruled out. Small multi-handled cups also seem to be the most commonly represented from in transitional blackware.

Overall the number of coarse earthenware sherds is quite small. Dishes, pans, jars and probable butter pots occur in a range of fabrics and glaze finishes. Most have internal glazes. Some potentially diagnostic rims are present in [6001]. Some coarse earthenware sherds may be grouped along with the less sandy-bodied Midlands purple wares, with which there are many similarities. Indeed, many are one and the same ware type, simply subjected to different firing temperatures and conditions.

Yellow wares occur as both fine and coarser types. The former include well-made and well-fired cups in a range of forms, and larger handled jars with prominent rims which are glazed inside and out. The latter are in softer fabrics, are less well-made and include dishes and bowls which are more likely to be glazed on the inside only [5001, 6001, 6800, 6801]. There seem to be no examples of stamped or incised decoration, which may be found on mid 17th-century yellow wares, but there are at least two sherds of yellow ware type with decoration which comprised slip-trailed dashes around the body. This style is known on mid 17th-century wares (as at Eccleshall Castle, for example) and on wares from production sites in north Staffordshire (Greaves 1976, 31 nos. 80, 83, 85, 87).

The majority of the slipwares, which are present in small numbers in [5001], [6000], [6001] and [6800], are thrown dishes with everted rims and trailed slip decoration in cream on an orange-pink fabric. Although a very common late 17th-century type (e.g. Kelly 1968), these also appear to have been in widespread use during the mid 17th century and are found in production groups of the period (e.g. Greaves 1976, 29 no. 52, 36 no. 133) and in Civil War period assemblages (e.g. Eccleshall Castle and

Dudley Castle). Two small sherds of press-moulded slipware dishes with embossed decoration have also been found in [5001] and [6001]. Again, these are typically later 17th-century types, but examples have been recovered from Civil War deposits at Eccleshall and Dudley Castles.

A small number of Rhenish stoneware bottles of ‘bellarmine’ or *bartmann* type are represented in those contexts which comprise sherds which are primarily of 17th-century date. Seven sherds, with joins, from [5001] are from one or perhaps two stoneware bottles; one is a neck sherd with part of an applied ‘bartmann’ face mask. A further nine sherds from [6001] probably represent just a single large bottle which has a large applied moulded medallion to its body. Other sherds occur in [6000] and [6801].

Four fine-bodied, high-fired purple ware type sherds from [6001] and a further one from [5001] are possibly from Martincamp flasks. If this is the case, then a 17th-century date is likely. However, the possibility remains that Martincamp-type vessels were made locally in imitation of the north-eastern French wares.

The majority of the ceramics from the 2006 excavations date to the 17th century, even in those contexts which are disturbed. As such, they reinforce the picture of ceramic use at Tutbury in the years around the Civil War which has already been established by the material from the 2005 excavations and from the work back in the 1980s. In this, Tutbury seems to be situated within the market area dominated by the potteries of Ticknall in South Derbyshire. Geographically this is logical, and it is to Ticknall that one must look for the source of the main ceramics types, Cistercian ware, Midlands purple ware, and perhaps also some, if not all, of the yellow wares and blackware. The influence of the Staffordshire potteries may be evident from the mid 17th century onwards with the appearance of slip-decorated wares and a better quality of blackware, but exactly how many of these wares may have originated in that area remains to be determined. The potential of wares from other sources, notably north Warwickshire and Wednesbury, being present has already been mentioned (Barker 2006), and a small, but potentially significant, number of imported wares are present.

6.3 Small Finds by Jon Goodwin

The small finds from the 2006 season of excavations at Tutbury Castle were sorted into material types, examined in order to determine diagnostic forms and features and quantified by weight. The assemblage comprises iron (614g), lead (723g), copper-alloy (49g) and miscellaneous material (bone, slate, etc.) (37g).

The glass assemblage (1292g) was sorted by form (window, bottle or vessel glass) and by body colour.

Once again, compositional similarities exist between this and previous assemblages from Tutbury (TUMS 86, TIGS 87, TC88 and TTD05). Diagnostic and datable finds are relatively few, although some probable medieval material and items almost certainly related to Civil War activity on site are present. The same absence of artefact groups such as dress accessories noted in the TTD05 assemblage, is mirrored in the 2006 material.

A summary of the more diagnostic elements of the assemblage, by material type, is presented below (a full finds catalogue is presented in tables 4 and 5):

Glass

The glass assemblage is characterised by window and bottle fragments, although a few possible vessel sherds are also present. The window glass is entirely undecorated and in poor condition with significant surface devitrification. This created difficulties in determining the original colour of some fragments, although three basic colours seem to feature in the group, namely aqua, green and clear. Although production evidence is mostly lacking, it is likely that all but the clear sherds are either cylinder or crown glass, representing the two most common methods of forming glass panes during the medieval period through to the early 19th century. One fragment from 6000 bears elongated surface bubbles, which may confirm production by the cylinder method (Janaway & Henderson 1983, 322). The thickness of the window fragments varies from less than 1mm to approximately 1.5mm. Thickness, however, could vary depending on the size of the window of which it formed a part and is not a reliable indicator of date. Two fragments look to be from a reticulated window: one, from 6000, partially retains its original diamond shape and another, from 6001, is clearly a triangular corner piece.

The bottle glass is unremarkable and dates exclusively from the 19th and 20th centuries. Probable vessel sherds are present in 6000, 6001 and 6801. The example from 6000 and at least one from 6001 appear to be 19th or 20th century in date, but the remaining fragments, including the two possible flasks and a mould-blown, reeded sherd, may be early post-medieval and therefore worthy of further study.

Lead

Shot is present in contexts 6001, 7007 and amongst the unstratified material. Diameters of 15mm-17mm predominate, representing 20 bore shot, although one from 6001 has a diameter of 18mm, indicating 12 bore, with another unstratified example measuring 13mm, approximately 48 bore (Courtney 1993, 159). Twenty-bore shot appeared most frequently in the TTD05 assemblage, and may suggest centrally supplied, 'all purpose' shot for use in unstandardised weapons (foreign imports or antique pieces) or sniping pieces (*ibid.*). The more standard 12-bore shot, suitable for mid-17th-century muskets with a calibre of 19-20mm, appears in the minority at Tutbury. The smaller 48-bore shot would have been used in either pistols or carbines (Mayes & Butler, 1983, 263).

Although most of the shot demonstrates some flattening and, in one example, gouging, evidence of use is limited. One 15mm diameter shot from 6000 is unusually light, weighing just 6g. Other similarly sized shot from the assemblage weigh between 22g and 24g, with comparable examples from Beeston demonstrating a similar weight range (Courtney *op. cit.*). It is likely, therefore, that this shot has been cast with an air bubble, and was almost certainly unusable.

Evidence of shot production appears in the form of a casting header with six runners spaced at 4mm-5mm intervals, recovered from 5001. This is identical to three examples from the TTD05 assemblage and two from the TC88 group. All attest to the

production of an extremely small diameter shot, which appears to have been common at Tutbury.

Examples of window came also feature within the assemblage, most of which are H-sectioned and milled, either in a toothed or toothless vice, indicating an early post-medieval date (Egan *et. al.* 1986, 303; Knight 1985, 156).

Iron

An iron rowel spur from context 5001 is of an identical form to two examples found during the 2005 season at Tutbury; all of which are comparable to 17th- to 19th-century spurs from Beeston Castle (Ellis 1993, 165, fig 113 10, 11,15).

A partial knife blade with whittle tang is present in 6001. Blades with whittle tangs were the most common type until at least the early 16th century (Cowgill *et. al.* 1987, 25). Early finds frequently have tangs which only extend part way into the handle, whereas later knives have one which runs through the length of the handle (*ibid.*), as does that of the Tutbury example. The form persisted into the post-medieval period, with late medieval to mid-17th-century finds from Beeston Castle (Courtney 1993, 136-7), Norwich (Goodall 1993, 124, 126-7) and Sandal Castle (Goodall 1983, 242-3).

Bone

Context 5011 contains a cubical bone die of irregular numbering. The common layout of values on dice from the Roman period is for opposite faces to total seven (1 opposite 6, 2 opposite 5 etc.) (MacGregor 1985, 131-2). From the 13th century onwards, however, dice with a numbering system in which 1 appears opposite to 2, 3 opposite 4 and 5 opposite 6, were also used (*ibid.*). The Tutbury example conforms to this latter type.

A turned bone handle, probably from a whittle-tang knife features in 6001. Similarly decorated whittle-tang knife handles of late 17th-century date are known from Beeston (Courtney 1993, 153-4).

6.4 Clay Pipes by David Higgins

Summary

As in previous seasons, almost all the pipe bowls recovered are of Civil War date and almost all of the stems would fit well with this dating too. Where later fragments do occur, they tend to be isolated pieces amongst mid-C17th assemblages, and particularly from the upper layers. This suggests low levels of later deposition on top of essentially Civil War deposits. The Civil War fragments are, however, rather abraded and no cross joins could be found, suggesting they have been redeposited or disturbed to some extent since being broken.

General

Mould Types

Eventually it would be useful to compare all bowl forms recovered from the various seasons of excavation on the site to identify and define mould types. Some groups are already evident, such as the very poor L11v with an angular heel plan and numerous mould flaws that occurs commonly on the site. This type is characterised by poor finish, occasional very poor burnishing and an unusually narrow stem bore. Detailed comparison and analysis of all the bowl fragments from the site should be carried out to determine the number and range represented amongst the Civil War deposits.

Stem Bore

Note that this is very variable amongst the Civil War period pipes. Some small bores of around 6/64" occur – typically associated with a specific bowl type (the crude one). Other pipes have very large bores (up to 10/64").

Production Methods

Marks inside 6001 (Y) – one of the crudely designed and finished pipes - suggest that the bottering tool had a cone shaped centre that projected at least 10mm into the bowl interior.

Cross Joins

Some attempt was made to join key pieces, such as bowl / stem junctions, within and between large groups, e.g., 6000 / 6001. No joins were found, suggesting the material has been moved about / mixed since being broken.

Reuse

One more stem with a ground end was recovered, plus one stem with lead wrapped round, perhaps for use as a mouthpiece.

Important Piece to Mention

A stem with lead wrapped around it from [6001] is the only known example from Britain.

Context Groups

6001

A large group, but generally well broken, suggesting a trampled and / or well-mixed deposit. The abraded nature means burnishing has probably been under-recorded. Despite the large number of fragments, no obvious joins could be found (bowl / stem junctions, etc). Likewise, there were no obvious joins between 6000 and 6001. There

was one very unusual stem fragment with lead wrapped around one end with probable tooth marks on it. Mould types are evident amongst the good number of bowls, and a wider comparison of all finds from the site would be useful.

Marks

Three examples of IG marks were recorded – all poorly impressed but which could be the same die (6001 G & H and 7002 B). The mould types are probably the same and these pipes are characterised by quite a hard, smooth fabric with glossy surface. One very fragmentary mark is probably GH, which needs checking against other examples. Distribution and makers for both marks need exploring.

6.5 Leather by Quita Mould

Methodology

The majority of the leather was either wet or damp with soil adhering; it was washed before examination. The remainder had dried out and small areas of white fungal growth were observed during examination. Leather species were identified by hair follicle pattern using low powered magnification. Where the grain surface of the leather was heavily worn identification was not always possible. The grain pattern of sheep and goat skins are difficult to distinguish and have been grouped together as sheep/goat when the distinction could not be made. The distinction between immature (calfskin) and mature cattle hides is not always easy to determine and the term bovine leather has been used when in doubt. Shoe soles and clump repairs are of cattle hide, unless stated otherwise.

Summary

A small group of leather (28 pieces) was recovered from the 2005 and 2006 excavations. All the leather came from an area within the inner bailey located between the 11th century bank and what is believed to be a ditch. The leather assemblage comprises shoe parts, straps, a small washer and waste leather. A proportion of the shoe parts had been cut up to salvage leather for re-use. This, together with the waste leather recovered, suggests that, rather than being purely domestic refuse, the leather comes from a leatherworker's workshop, probably that of a cobbler. The leather appears to be contemporary with the late 11th and 12th century pottery with which it was associated. Relatively few well-dated groups of leather of this date have been published from Britain but the leather from Tutbury Castle has features present in contemporary material from London and York.

Shoes

A small number of broken shoe parts were found, principally in contexts 6505 and 6506 and include a fragment of turnshoe sole [5], two clump seat repairs [6, 28] used to patch worn out shoe soles, and fragments of shoe uppers. The upper fragments lack diagnostic features for the most part and none were sufficiently complete for the style of shoe to be known with certainty. A fragment of calfskin with three lines of paired thong slots [9] running at right angles to a grain/flesh seam may come from the upper of an ankleshoe that fastened with a drawstring that passed through a series of

vertical, thonged loops running up the leg. This shoe style was popular during the 12th-mid 13th century (Mould, Carlisle and Cameron 2003, 3319-3321). A folded strap of cattle hide [8], 23mm wide with a whip-stitched edge, appears to be a topband from the top edge of a shoe upper. Topbands were a feature of many shoes of this date, some were decorated and many were surprisingly wide (Pritchard in Vince 1991, 236-8). A fragment of bovine leather with a whip stitched 'dog-leg' seam [7] and small fragments [eg. 12}, some with areas of seams remaining [10, 27], are also likely to be torn and cut from shoe uppers.

The remains of a shoe of adult size were found in context 4011. It comprised a one-piece upper [2] of calfskin, deliberately cut away to salvage re-usable leather so that only the lower area of the shoe and lasting margin now remains. The upper was associated with the narrow tooled strip 14mm wide. The use of this narrow strip with linear tooling is uncertain. Having no stitching present it does not appear to have been sewn to another object as one might expect if it were a decorative topband. It might be a highly decorative drawstring fastening. Drawstrings were used to fasten footwear at this date and were also used on pouches, purses and other items.

Strap

Two joining pieces of folded strap [25/26], of cattle hide 33mm wide, with a broken terminal originally looped around a buckle frame and stitched down with leather thong, were found in two adjacent contexts (6505, 65060. The sides of the strap are folded and joined with a central, closed seam running along the back. A line of stitching runs along each folded edge. Folded straps of this type have been found in contemporary contexts at London and York (Pritchard in Vince 1991, 239; Mould, Carlisle and Cameron 2003, 3397).

Waste Leather

A small quantity of secondary waste trimmings, deriving from cutting out pattern pieces during the manufacture of leather goods, was found in two contexts (one fragment [4] in 4011, four fragments [15-18] in 6505). Primary waste was found in context 6505 and comprised three trimmings [20-2] from hide edges of sheep/goatskin and cattle hide and a leg cut from a bovine hide [19]. The recovery of this waste leather indicates the disposal of rubbish from leatherworking, albeit on a very small scale.

6.6 Animal Bone by Matilda Holmes

Methodology

All 2,122 fragments were recorded, of which 831 were identified to species, but only 522 of these came from phased contexts. The small size of the assemblages means that the data is of little use in isolation, however, it will be further considered in relation to the 2005 material (Holmes 2006).

Bones were identified using the author's reference collection, and further guidelines from Cohen and Serjeantson (1996), Hillson (1992), Prummel (1988) and Schmidt (1972). Due to anatomical similarities between sheep and goat, bones of this type

were assigned to the category ‘sheep/goat’, unless a definite identification using guidelines from Prummel and Frisch (1986) or Payne (1985) could be made. Bones that could not be identified to species were, where possible, categorised according to the relative size of the animal represented (small – rodent/rabbit sized, medium – sheep/pig/dog size, or large – cattle/horse size). Ribs were not identified to species.

Tooth wear and eruption were noted using guidelines from Grant (1982) and Silver (1969), as were bone fusion (Amorosi 1989, Silver 1969), metrical data (von den Driesch 1976), anatomy, side, zone (Serjeantson 1996), pathology, butchery, bone working and condition (Lyman 1994) of the bones.

Taphonomy and Condition

The bones were in a good to fair condition, although they were fragmentary and complete bones uncommon. Taphonomic factors affecting the material were recorded; less than 1% of the assemblage had been burnt, 1% recently broken, 6% showed signs of canid gnawing and 4% of fragments had butchery marks on them. 41 fragments were able to be conjoined to make 16 larger fragments. There were no articulated remains.

The absence of sieved samples may lead to a negative bias in the number and variety of small mammals, fish and bird bones recorded in the assemblage.

Species Representation and Diet

As Table 6 shows, the majority of those bones identified to species came from 12th-century deposits. Smaller quantities came from later medieval and post-medieval contexts. In contrast to this, the 2005 assemblage was dominated by remains from the 17-19th centuries, and far fewer from 11 – 12th-century contexts.

12th Century

Of the 334 fragments identified to species, pigs were by far the most common species, present in nearly 45% of the assemblage. Sheep/goat and cattle were found in 22 and 17%, respectively. Red and roe deer were the next most common animals, followed by chicken and goose. Horse, dog, wild birds (mallard, crow, pigeon and woodcock) and rabbit were also identified, but in smaller quantities.

In order to investigate bias that may occur towards the high fragmentation of larger bones a restricted count was employed. The restricted count of the ends (epiphyses) of bones is further discussed by Grant (1984). Table 7 shows that pigs were present in far lower numbers in the restricted count than the fragment count suggests, and sheep/goats and domestic fowl (chicken and goose) in greater numbers. This could be due to the smaller bones of the latter species being less likely to break into as many pieces as those larger ones from pigs. Numbers of fragments from the larger species (cattle and horse) were similar in both counts, as the high fragmentation of the assemblage meant that small pieces of large bones were more often labelled as unidentified.

The 2005 material from this phase was recovered in far smaller numbers (Table 8), and although there were similar proportions of pig and deer there were more cattle and horse, and fewer sheep and domestic fowl.

15th – 16th Centuries

Pigs, cattle and sheep / goat were recorded in similar quantities, although the assemblage was too small to place any emphasis on numbers. Chicken, goose, red and roe deer were also recorded.

Medieval

Only 3 bones were retrieved from this phase, from sheep / goats and pigs.

Late 16th – Late 19th Centuries

This phase produced the second largest assemblage (127 fragments), of which cattle predominate, although sheep/goat remains were also found in a significant proportion. Pigs were found in far smaller numbers than in previous phases, and horse, dog, chicken, goose, deer, rabbit and hare were also noted. Similar proportions of species were also noted in the epiphysis count (Table 6).

There were far fewer identified bones from the 2006 season than that of the previous year, and so differences in species proportions - there were more cattle and sheep/goat in the 2006 assemblage, and fewer domestic fowl, pig, horse and dog (Table 7) – cannot be interpreted as a significant trend.

Pig, domestic bird (chicken and goose) and deer numbers appear to have decreased in proportion to cattle and sheep/goat through time, and wild birds were only present in the 12th century. This is similar to trends noted in the 2005 assemblage, although in the latter, cattle numbers were consistently around 30% through time, and did not increase, as suggested by the 2006 assemblage.

Diet

In all phases the main domestic species (cattle, sheep / goat and pig) would have been the main providers of meat, along with chicken and goose. A fairly diverse range of wild species was present in most phases, which would potentially have provided additional meat, particularly venison, and suggests that deer, fowl, rabbits and hare were hunted. The absence of articulated bones from hare and rabbit implies they contributed to the diet, rather than being an intrusive species. The relative absence of dog and horse from this assemblage suggests these animals were not eaten, although the high number of gnawed bones points to the presence of dogs on the site.

As the assemblage is small, a detailed comparison with other castle sites is inappropriate, although similar species have been found at Dudley Castle, West Midlands (Thomas 2005), Sandal Castle, Wakefield (Griffith *et al* 1983), Scarborough Castle, North Yorkshire (Weinstock 2001), North Elmham Park, East Anglia (Noddle 1980), Barnard Castle, Durham (Jones *et al* 1985) and Okehampton, Devon (Maltby 1982).

Carcass Representation and Butchery

Table 8 shows the representation of bones from different parts of the carcass (shins, feet, upper fore and hind limbs and head and vertebrae). The data from 12th-century deposits revealed very few cattle and sheep/goat shin bones. Phalanges were uncommon for all three domestic species, although these bones are often subject to poor recovery, due to their small size; however, the absence of larger cattle phalanges suggests a real dearth of these bones. High meat yielding limb bones were commonly found for all three species, with the exception of cattle fore limbs. Vertebrae were found rarely, although they were present in high quantities in the cattle assemblage. Mandibles were only recovered from sheep/goat and pigs. The anatomies present in the pig assemblage differ from those of cattle and sheep/goat, as all parts of the carcass were recovered, with the exception of phalanges, which points to the consumption of whole pigs at the table, or the butchery of pigs on site. This may have been the case, as evidence from the 2005 material for neonatal pigs would suggest they were bred and reared in the vicinity.

In the later phases similar trends apply: feet and shin bones were found rarely when compared to the more common limb bones. Fragments from head and vertebrae were absent in all species.

Although butchery marks were not commonly observed they were present on cattle, sheep / goat, pig and red deer bones. There were superficial knife marks on a red deer astragalus, and pig metatarsal and tibia fragments, possibly indicative of skinning and / or dismemberment. Chop marks from the dismemberment of the carcass were found on meat bearing bones of red deer, cattle, sheep / goat and pig.

The predominance of meat bearing bones and lack of primary butchery waste (vertebrae, phalanges and skull fragments) suggests that this assemblage is one of a domestic nature, being the result of deposition of food refuse where animals were probably brought to the site as dressed carcasses, having been butchered elsewhere, similar to that seen in the 2005 assemblage.

Diet and Economy

Cattle

Due to the scarcity of mandibles and skull fragments in the assemblage there was no tooth wear or eruption data suitable for ageing the cattle assemblage, although the small amount of fusion data (Table 9) suggested patterns in cattle mortality were similar for all phases. There was no evidence for cattle being killed before 36-42 months of age, at which point there was a fairly consistent cull of animals, in all phases. A number of mature animals over 48 months of age were present within the 12th and late 16th – late 17th-century assemblages. No new born animals were apparent. This is rather different to the results of the 2005 season, where neonatal animals were present in 15-16th and 17-19th-century deposits, and in all phases a cull of animals at earlier ages is noted.

The data suggest that cattle were important for secondary products in all phases, as there were a large number of mature animals, implying they were not specifically bred for meat production, and those eaten were surplus to requirements as milk producers or as plough or draught animals.

No horn cores were recovered, possibly reflecting the fact that cattle were brought to the site as dressed carcasses. This further suggests that, if cattle were horned, horn working would have taken place elsewhere.

Sheep and Goats

The growing numbers of sheep through time is a common trend, and coincides with the increase in the importance of wool in the economy (Grant 1988). Both sheep and goats were present in 12th-century contexts, and sheep were positively identified in 16 – 19th century deposits.

The fusion data from the 12th-century assemblage (Table 10) suggests there were culls of animals at 6-10 and 30–36 months of age, although a number were kept alive into maturity. There was no evidence for neonatal mortalities. In later phases there was very little data, and nearly all bones were fused, with the exception of an animal in the late 16th – late 17th-century phase which was less than 36 months at death. The only tooth eruption data came from a goat that would have been less than 6 months old when it died. This data is similar to that recorded from the 2005 season, implying that sheep were important for secondary products of wool and maybe milk, and those animals culled at younger ages were excess to requirements.

A femur dated to the 12th-century showed signs of eburnation on the articular condyle, indicative of joint degeneration common in older animals. A number of bones were complete enough to be used to calculate wither heights (using indices from Teichert in von den Driesch and Boessneck 1975), these came from individuals ranging from 0.62 – 0.63m in height. One animal from the 15th – 16th-century phase was apparently larger – 0.67m. The heights of animals from 17-19th Century deposits in the 2005 assemblage were larger again (0.66m and 0.71m), which may suggest that a new breed was introduced, or that stock improvements were being carried out. This trend is not unusual at the time of the industrial revolution (Thomas 2005).

As with the 2005 material there was no evidence for horned species of sheep or goat, which is in keeping with documentation from the time indicating that the common breeds of the area were polled (Lewis 1973).

Pigs

As Table 10 indicates, there was no evidence for neonatal pigs in the assemblage, and very few bones were from animals less than 24 months of age, although some animals in the 12th and 15 – 16th centuries would have died before reaching 12 months. There was no evidence in any phase for animals surviving over 36 months of age. These patterns are reflected in the tooth wear data, where animals are represented that would have been less than 9 months old, and others at mandible wear stages 20, 25 and 40. This reflects patterns noted in the 2005 assemblage, where animals were culled at the time when they would have produced the highest meat yield.

A fibula from a 12th-century context had been broken, but subsequently healed, an injury also noted in a 17-19th-century context from the 2005 season.

Other Animals

All horse, hare and rabbit bones were from mature animals, as were most deer bones although 1 roe deer metacarpal from a 12th Century context was unfused at the distal end, as was a red deer proximal femur from the 15-16th -century phase.

The presence of a number of wild species (deer, hare, rabbit and birds) suggests that these animals were hunted from the surrounding countryside. As with the 2005 assemblage hare bones were only recovered from the post-medieval phase. Fallow deer were also more common in this phase, in relation to a decrease in numbers of red and roe deer, again a trend noted in the previous seasons faunal remains.

Birds

Despite the small size of the assemblage, there were a diverse number of wild bird species present, particularly in 12th-century deposits. These included crow and duck (mallard). Woodcock was found in unphased contexts. Chicken and goose were present in small but significant numbers in all phases, and it is likely that these and the less commonly found pigeons were kept on site.

Nearly all bird bones were from mature individuals, although a chicken humerus from the 12th century and a tarso-metatarsus from the 15 – 16th centuries were unfused.

Discussion

The material from the 2006 excavation emphasises the previous year's interpretation of a high status site reflected in the faunal remains. Again high numbers of pigs, deer and other wild animals are indicative of such status. This is also highlighted by the lack of butchery or industrial waste, implying the remains are primarily from food refuse, of which bones that would have produced the best cuts of meat predominate. Interestingly, the beef and lamb eaten was not generally from animals of prime meat producing age, but from older individuals, suggesting that they were important for secondary products over their meat value. The meat from cattle and sheep / goats brought to the site would probably have been produced in the surrounding countryside, where activities such as dairying, wool production and ploughing and traction would probably have been commonplace. It is likely, however, that pigs, domestic fowl (chicken and geese) and pigeons were kept within the castle grounds.

Notable differences between the assemblages from the two years such as those seen in species proportions and mortality profiles of the main domestic animals, as well as the dearth of 15 – 16th -century material suggest areas for future research. In particular, a more detailed look at spatial differentiation of species and anatomy throughout the sites may be practicable, depending on the quantity and quality of bones recovered in any future excavations.

7.0 Conclusions by Malcolm Hislop

7.1 Non Invasive Survey

The most significant result of the geophysical surveys this year has been the large circular anomaly located in the outer bailey (Feature 1), together with adjacent

anomalies suggesting the remains of buildings or other structural features. Speculation is unlikely to be helpful at this stage, suffice it to say that this area in the outer bailey has a high archaeological potential that may repay further investigation. Also worthy of further work, perhaps, is the smaller, but similarly enigmatic circular anomaly within the middle bailey (Feature F).

7.2 Area 1

The results of the excavation in Area 1 were inconclusive, but are generally suggestive of an open area centred on the principal feature of a rectangular slab-like structure, the dating evidence for which produced a broad range between the 12th-century and the 17th century. The structure has the appearance of being constructed from re-used material, and is likely to date from the post-medieval period. Its purpose has yet to be established, but at the moment the most likely explanation is that it served as a plinth, the possible postholes at its south end suggesting a surrounding fence or a canopy.

Other aspects of the excavated area also belong to the post-medieval period. The wall foundation in the northwest corner probably represents an early 17th-century timber-framed structure on the edge of the open area, which went out of use by the mid-17th century. It is difficult to be specific about the possible hearth or oven and its associated burnt area in the southeast quadrant, other than to suggest that there may have been cooking going on in the open. This area also seems to have gone out of use in the 17th century when the whole area was levelled. It is possible that the apparent termination of activities in this sector is associated with the changes wreaked by the slighting of the castle during the Civil War.

7.3 Area 2

One possible interpretation of the feature at the northwest end of Area 2A (6512) is that it represents the scarp of a ditch extending along the inner side of the rampart, and forming a continuation of the linear feature represented by the area of low resistivity further to the north. The presence of late 11th/12th-century pottery in the fill of 6512 suggests that it dates from the earliest period of the castle, and that it is contemporary with the truncated rampart revealed in the test pits to the southeast. If so, behind the rampart there would have been a berm some 6-7m wide then the inner ditch of approximately 5m wide. The whole complex of fortifications would have defended a much smaller inner bailey than the present one.

The early pottery that appeared not only in the putative ditch (6512), but right across the excavated area in the lower layers, shows that this arrangement was comparatively short lived, and that the area behind the rampart, including the putative ditch itself, was soon covered with organic material. That this material contained pieces of leather, and substantial amounts of birch bark suggested the possibility of tanning having been carried out here. On the whole, this seems improbable given the high status of the site, and the organic build up may instead represent the accumulation of rubbish in a peripheral area from an early date in the castle's existence. This accumulation of debris appears to have been sealed in two stages by a 0.4m build up of clay, apparently in the 12th century.

Work in areas 2B to 2E has extended our knowledge of the building identified with the domestic quarters of Mary Queen of Scots, previously investigated in 1957, 1988, 2004 and 2005. This building, which was aligned northeast-southwest, facing northwest towards the bailey, is now known to have had an external width of 5.68m, and the northwest wall has so far been traced for a distance of 8.26m (27ft 1in) from the north corner of the structure. Towards the north end of this wall there was a 2.4m (7ft 10ins) wide porch projecting at least 2.3m (7ft 6ins) to the northwest. Exactly when this building was raised is, as yet, uncertain, but a late medieval/early post-medieval date seems likely. More certain is the date at which it went out of use, which seems to have occurred in the mid-17th century.

The character, date and position of this building appear to be consistent with the structure recorded in 1585 by both Mary Queen of Scots and her jailer Sir Ralph Sadler as Mary's lodging (Hislop and Williams 2006). It has to be said that the building has not yet been traced in its entirety, and that its full extent cannot, therefore, be verified without the benefit of further below ground investigation. However, the indications are that this is the building depicted in Sadler's plan of the castle.² There is no obvious representation of the porch in Sadler's drawing, but as this is a schematic depiction showing both external and internal aspects of the building, this does not necessarily militate against the identification.³

7.4 Area 3

The nature of the remains on top of the motte that were uncovered in 2005 (Martin-Bacon and Kinsey 2006, 19-22) have become clearer as a result of this year's excavation, and, to combine the results of the two seasons, we can now see that the stone remains at the northern edge of the motte comprise the corner of a stone building, formed by its northeast and northwest walls, and that the stone pavement further to the south (*Ibid.*), lay on the line of the northeast wall. The top of the bedding surface for the pavement was 0.3542m (1ft 2ins) above the top of the wall foundations in Area 3a, and the top of the stone pavement 0.9058m (2ft 9¾ins) below the top of the wall itself.

The most obvious interpretation of the excavated structures is based on the two 16th-century illustrations, which show a circular tower or keep on top of the motte with a polygonal or sub-polygonal mantlet wall surrounding it. The perspective view depicts the mantlet as a hexagonal structure, and although the plan is less clear, both seem to agree that two of the wall sections meet at the north side of the motte. It is reasonable to assume that this is the structure uncovered in Area 3a.

However, if the two conjoining walls formed part of a perimeter wall around the top of the mound, it is hard to see the paved upper surface as anything other than an allure or wall walk. The difficulty with this explanation, however, is that if this were the medieval arrangement, then the outer face of the wall can have consisted solely of a parapet little more than 2m (6½ft) above the foundations on the outer side. Such an arrangement would have amounted to little more than a decorative crown around the top of the motte. It is hard to reconcile such an arrangement with a medieval context,

² BL Add. MS 33594, F. 174-5

³ For further discussion of the historical evidence see Hislop and Williams 2006.

and it is possible that it represents the reconstruction or remodelling of a medieval structure using recycled material, perhaps the result of the repair programme ordered for the ring wall around the motte in 1561.

The stone pavement in Area 3b is also problematic in that it lies on the projected line of the northeast wall, and therefore represents a break in the supposed circuit. This could have been an entrance, although none of the 16th-century drawings show an opening in this position.

8.0 Acknowledgements

The Tutbury Castle research project was instigated by Mrs Lesley Smith, the castle's lessee and is under the direction of Dr Gareth Williams of the British Museum. The 2006 season was funded jointly by the British Museum and the University of Birmingham. Dr Malcolm Hislop directed the archaeological programme and Chris Hewitson supervised the excavation assisted by Phil Mann and Emily Hamilton of Birmingham Archaeology, and Dr Gareth Williams and Richard Kelleher of the British Museum. Mark Kincey supervised the topographical and geophysical surveys. Thirty undergraduate students and three post-graduate students from Birmingham University took part in the training programme, which was monitored by Dr Malcolm Hislop. In addition, a number of volunteers took part in the excavation through the agency of the Birmingham branch of the *SPICE* organisation, and the *Support Into Work* organisation of Derby. We are grateful to them and to the staff of Tutbury Castle for their interest and support. Ian George monitored the project for English Heritage and Steve Dean for Staffordshire County Council.

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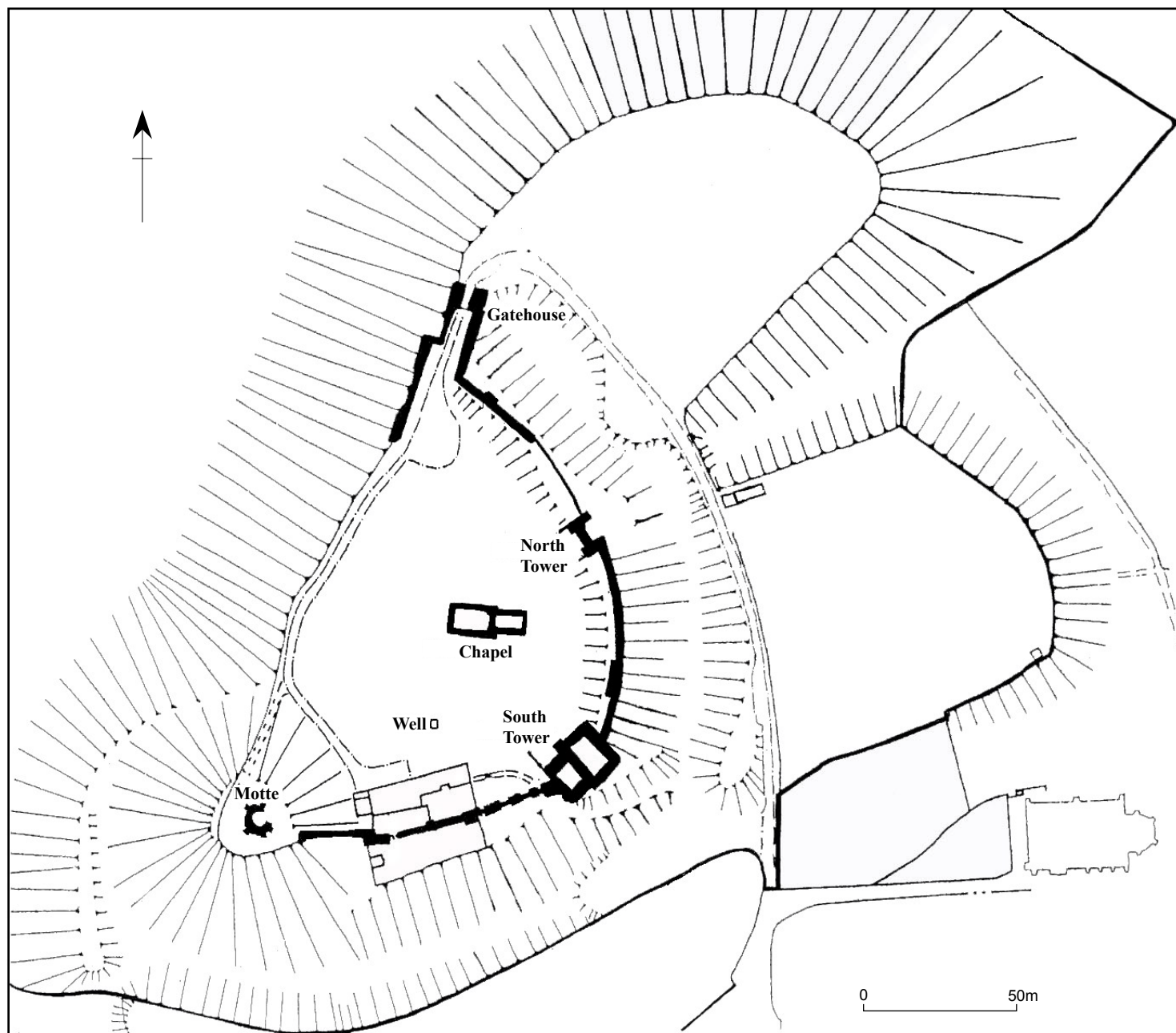
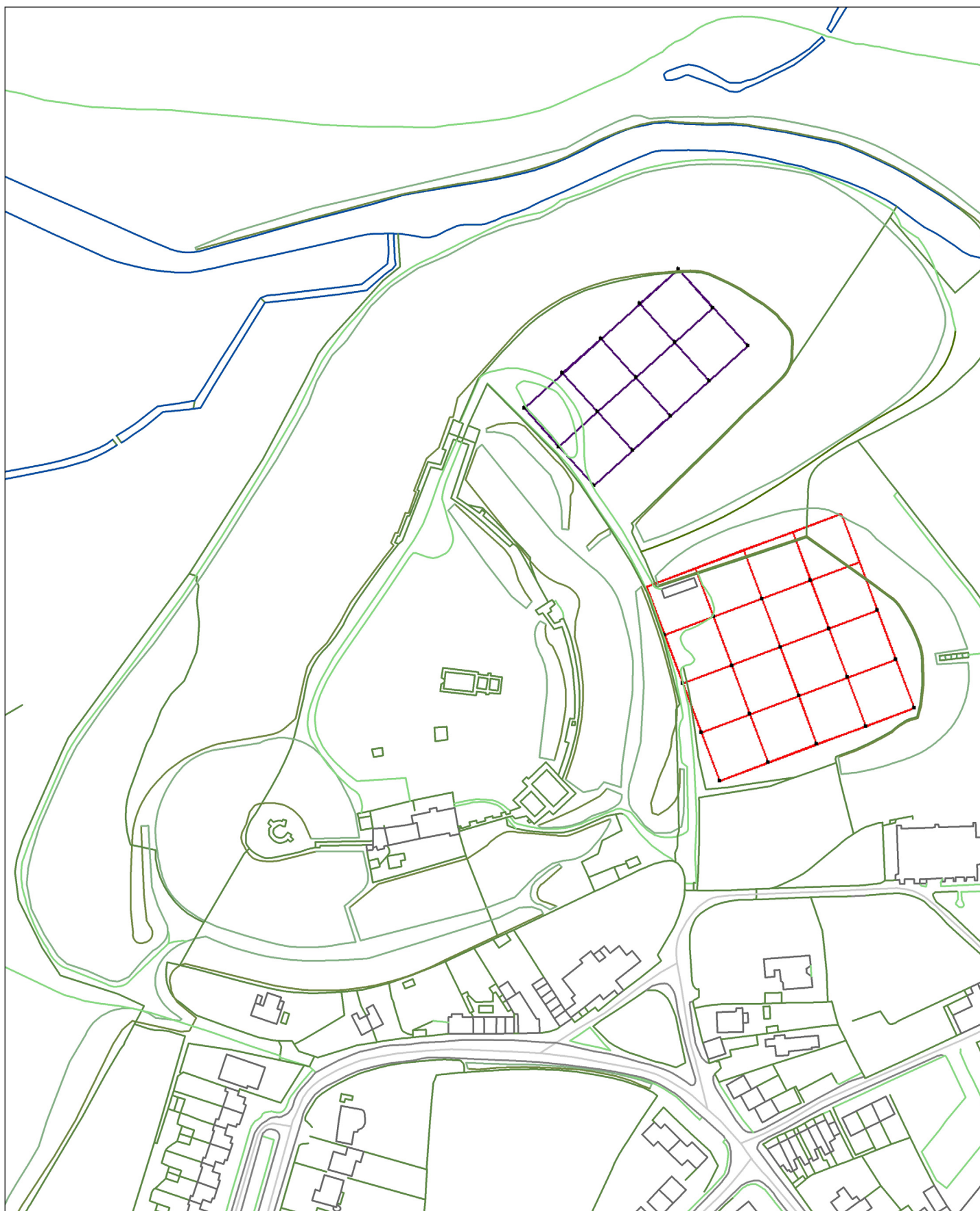


Fig.1



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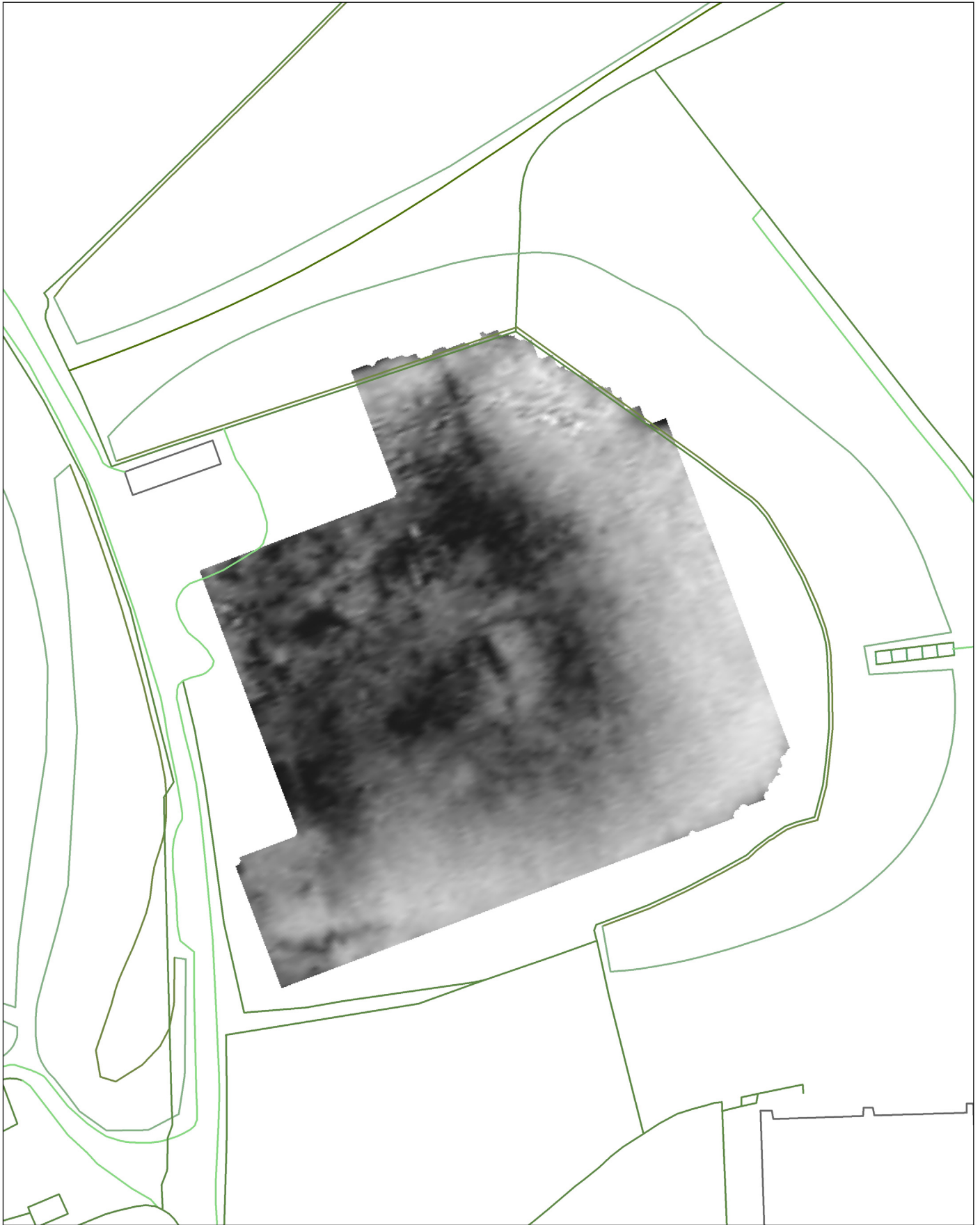


Figure 2 - Site plan showing location of middle bailey (purple) and outer bailey (red) geophysics survey areas







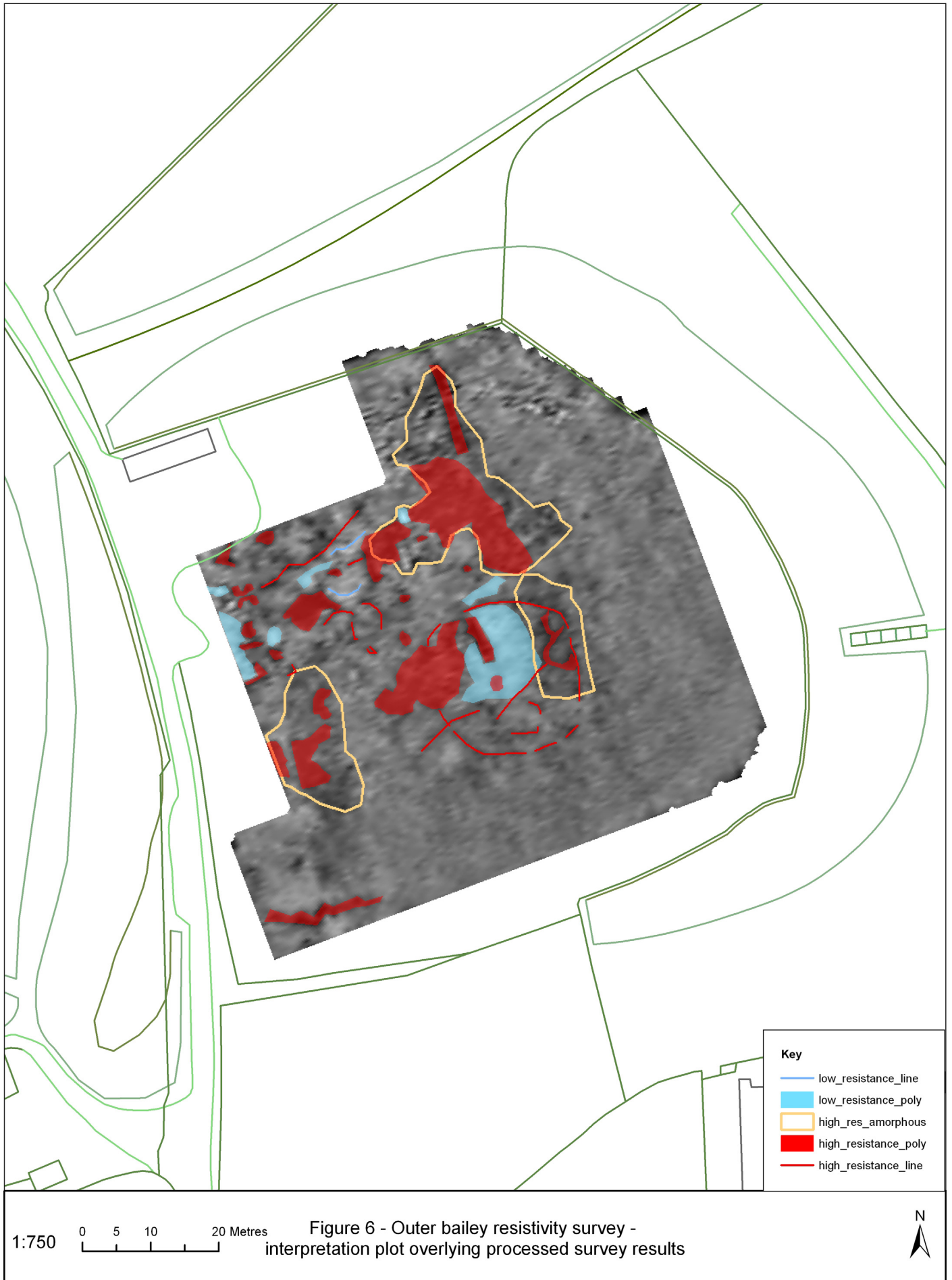


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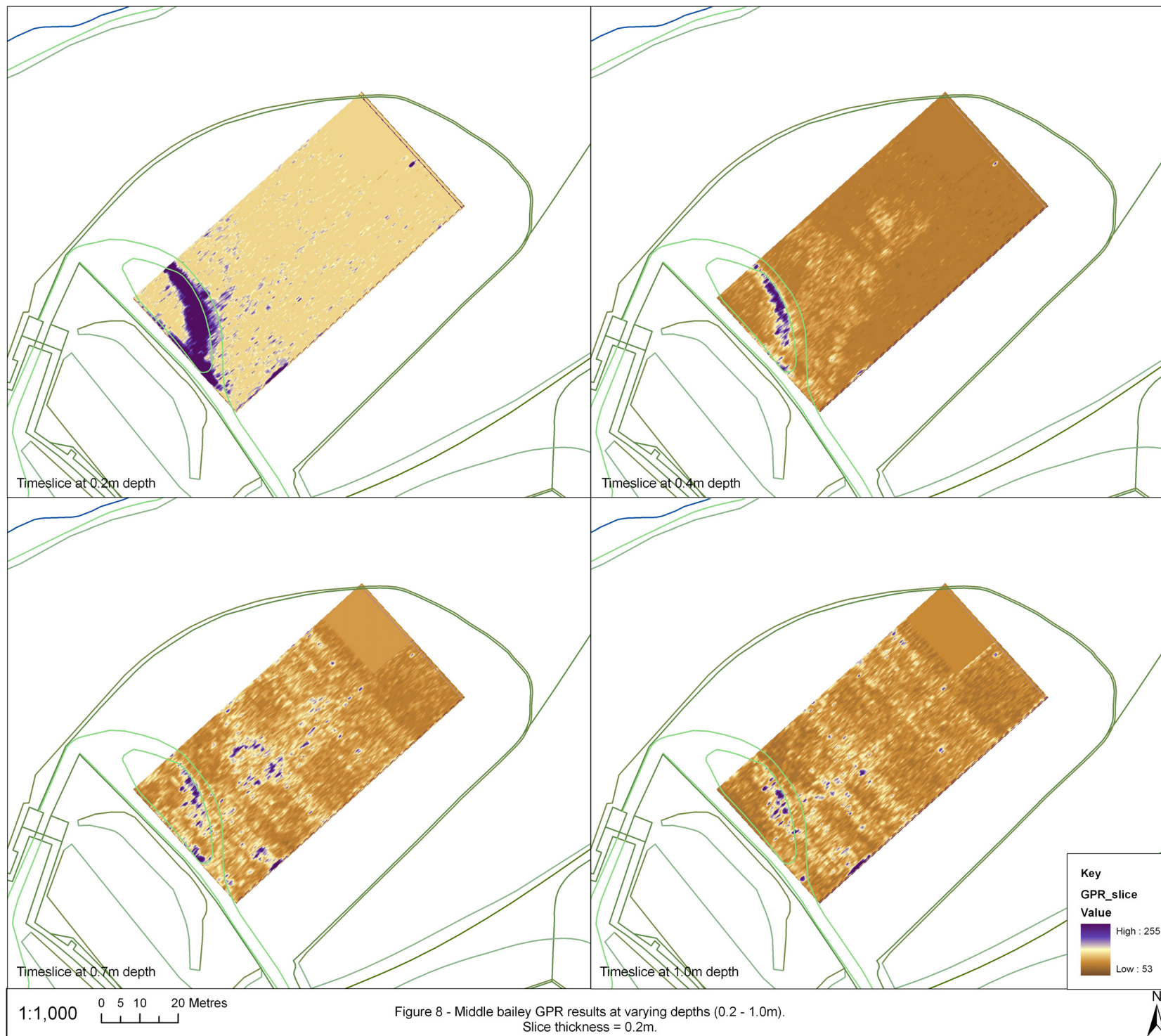
0 5 10 20 Metres

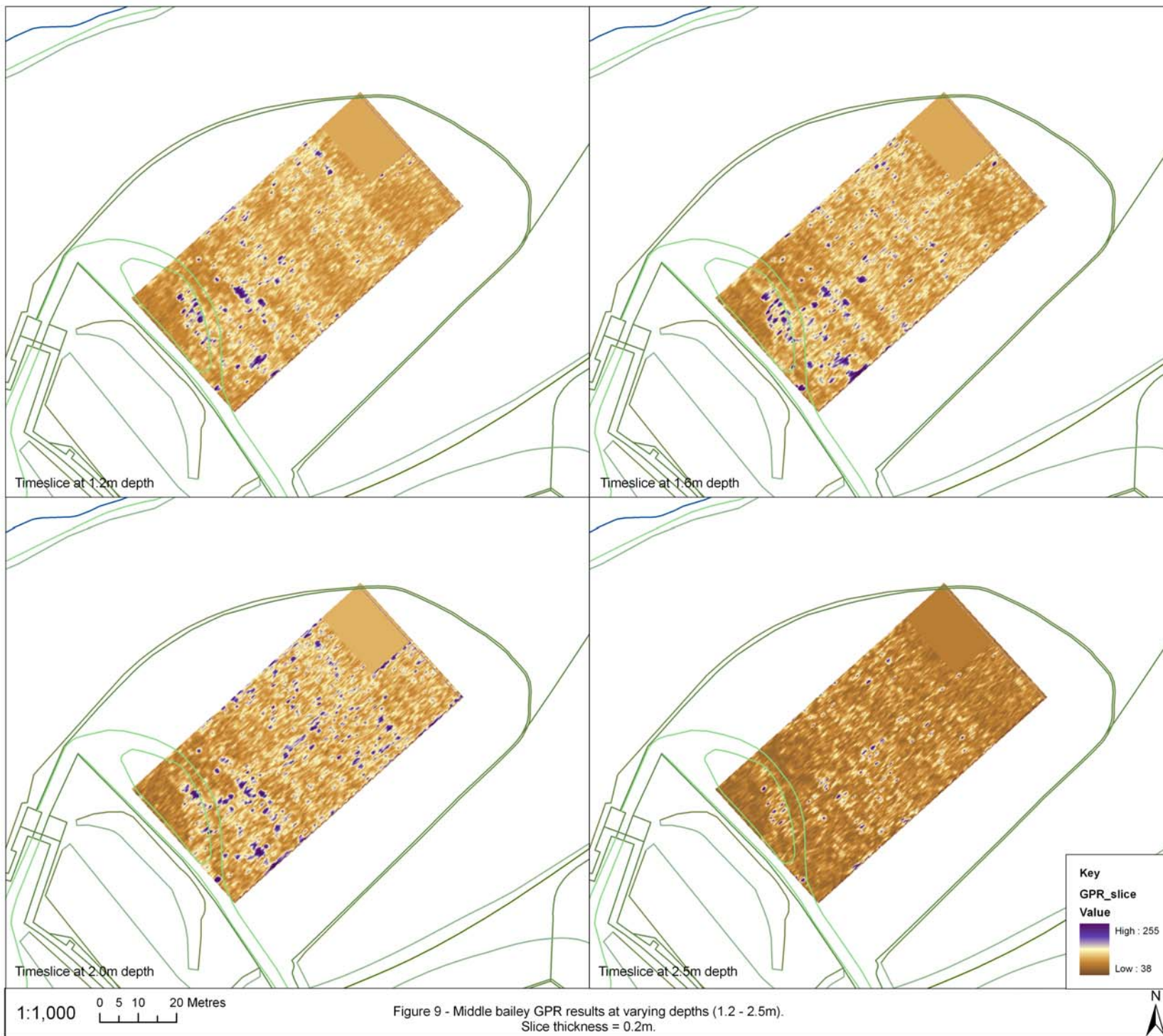
Figure 5 - Outer bailey resistivity survey -
processed results (low pass filtered)

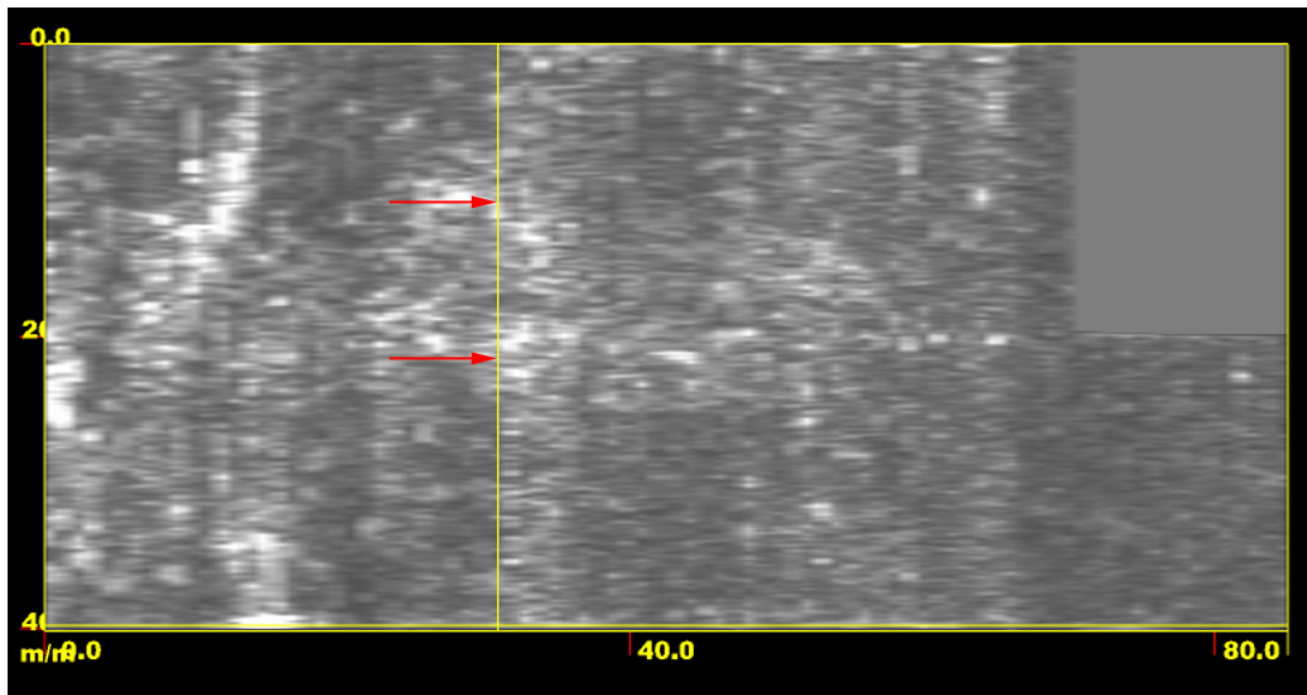




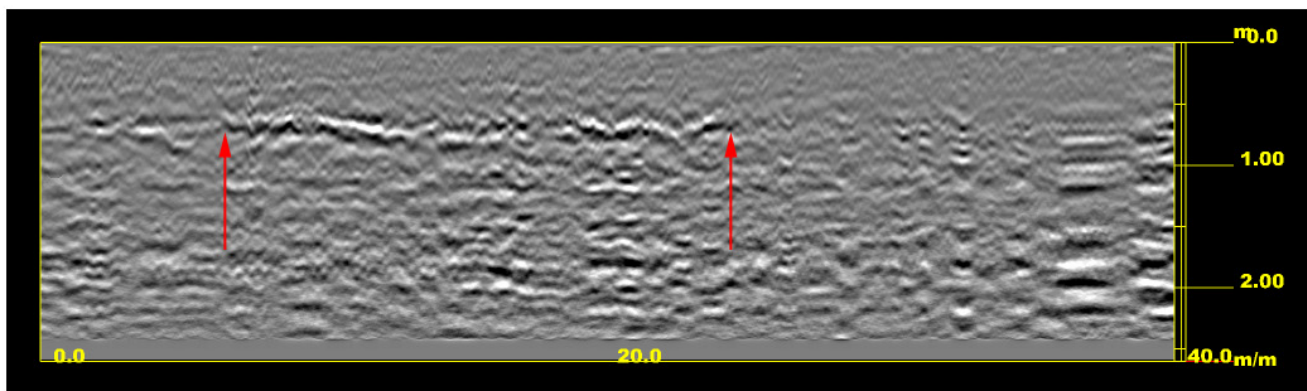






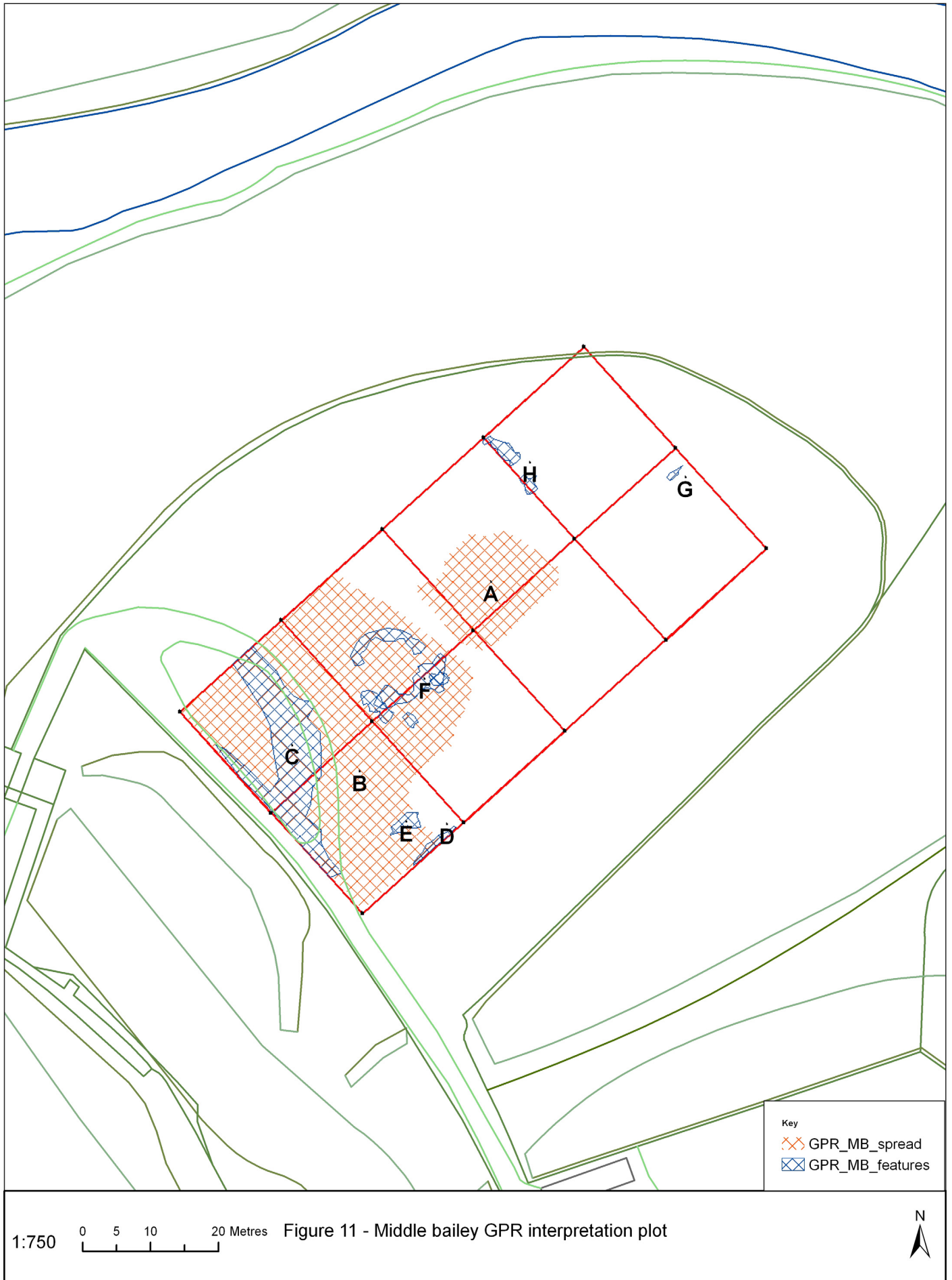


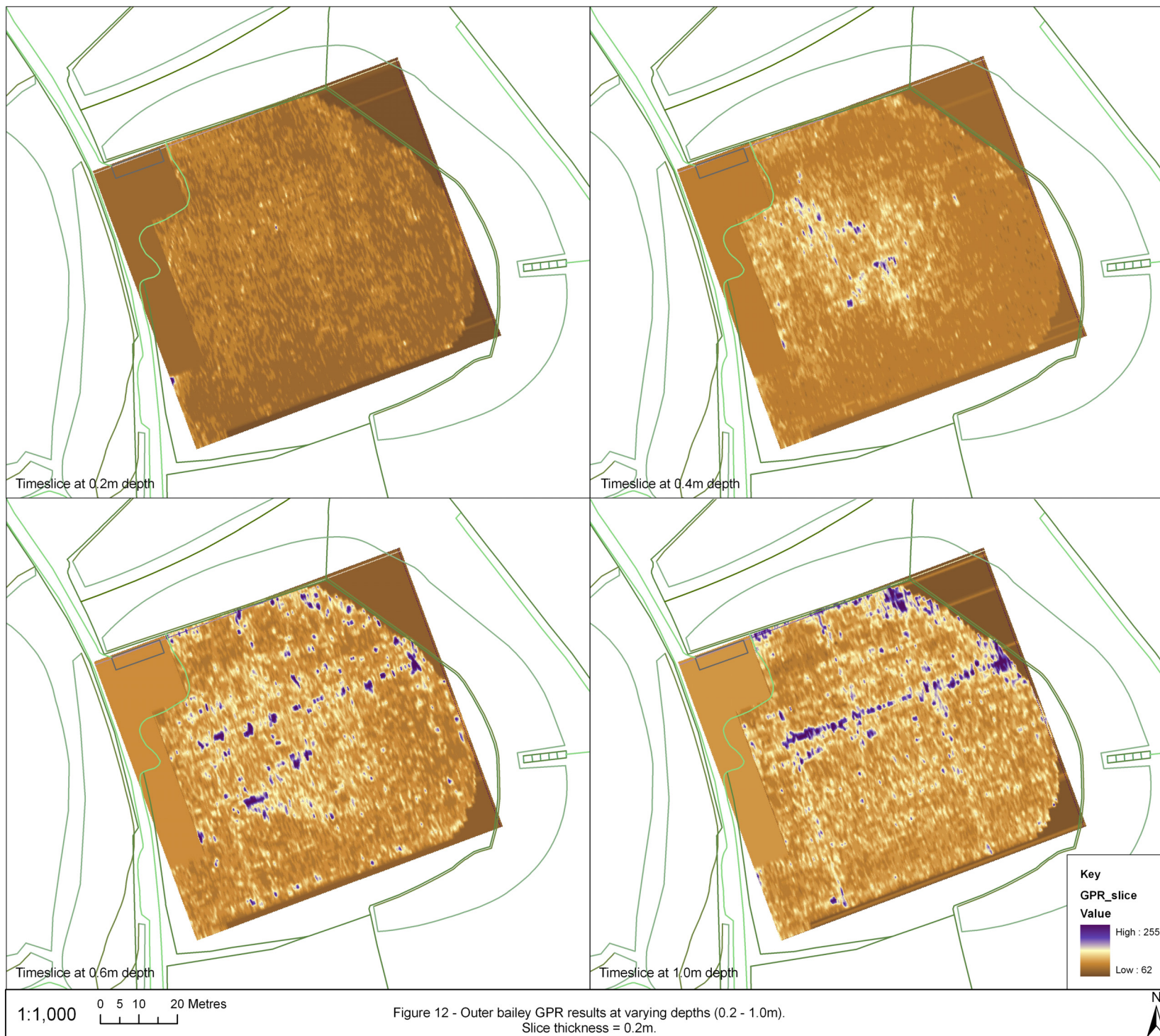
Middle bailey GPR timeslice at a depth of 0.69m, showing the feature F as referred to in the text. The vertical yellow line marks the location of the profile shown below.

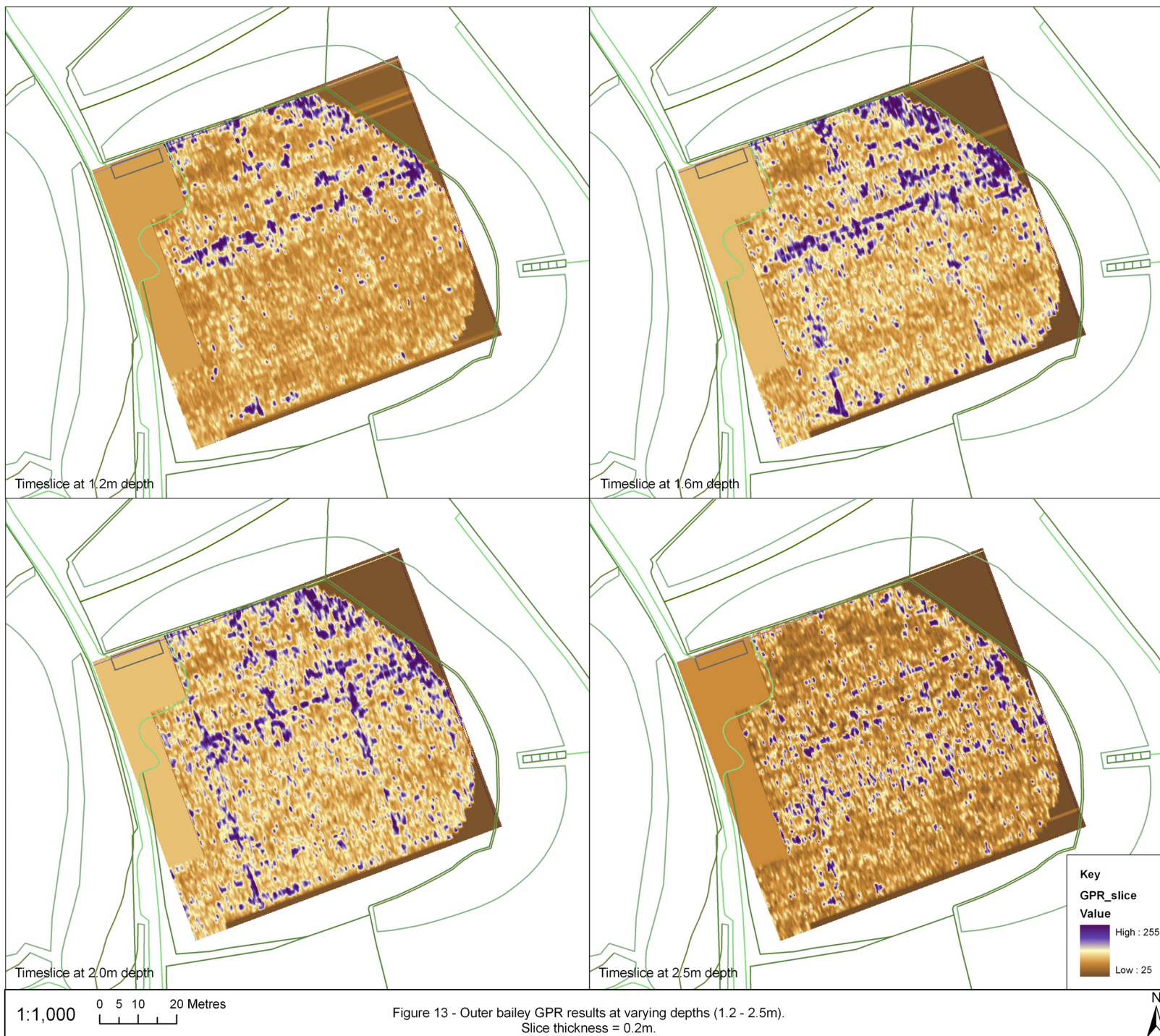


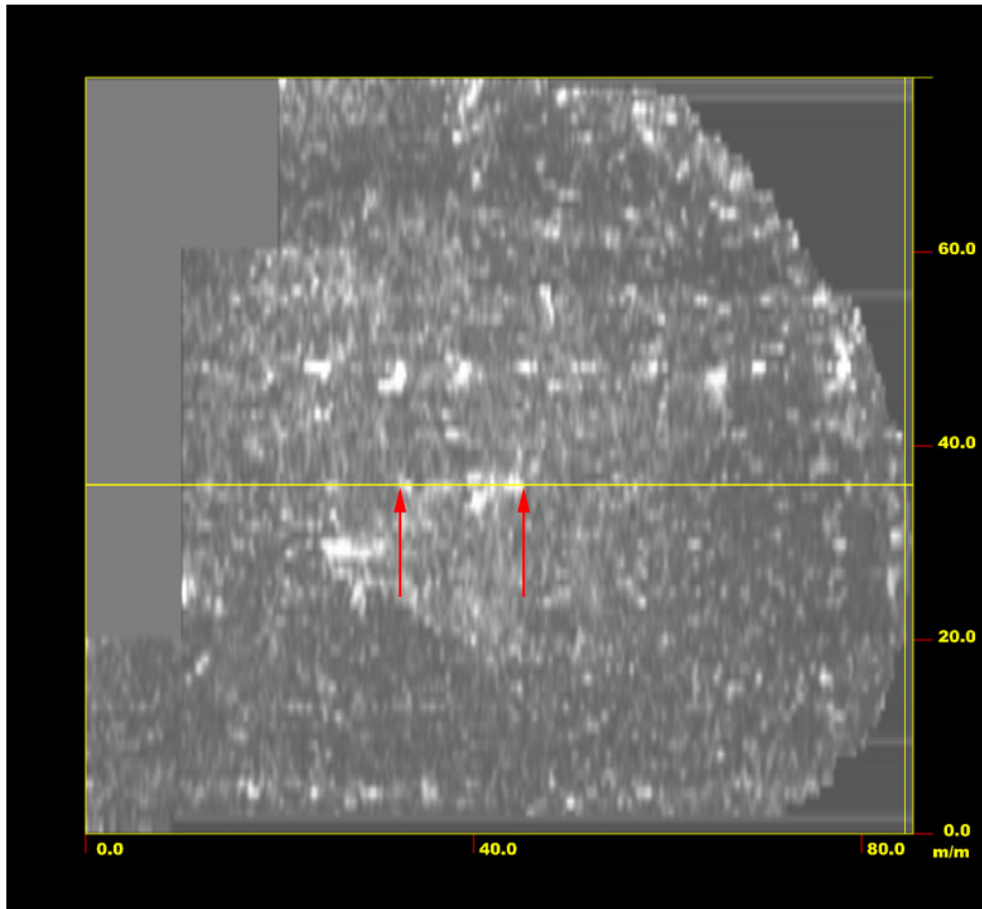
Middle bailey GPR profile showing the feature F as a clearly defined surface response (between the arrows)

Figure 10 - Middle Bailey GPR feature F shown in profile and timeslice form

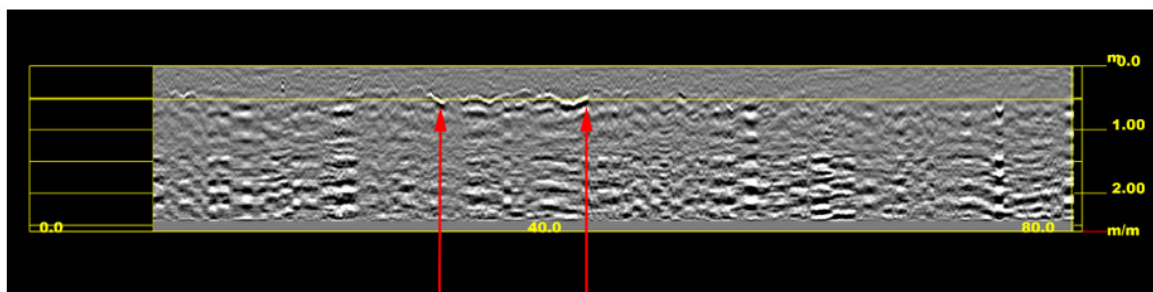






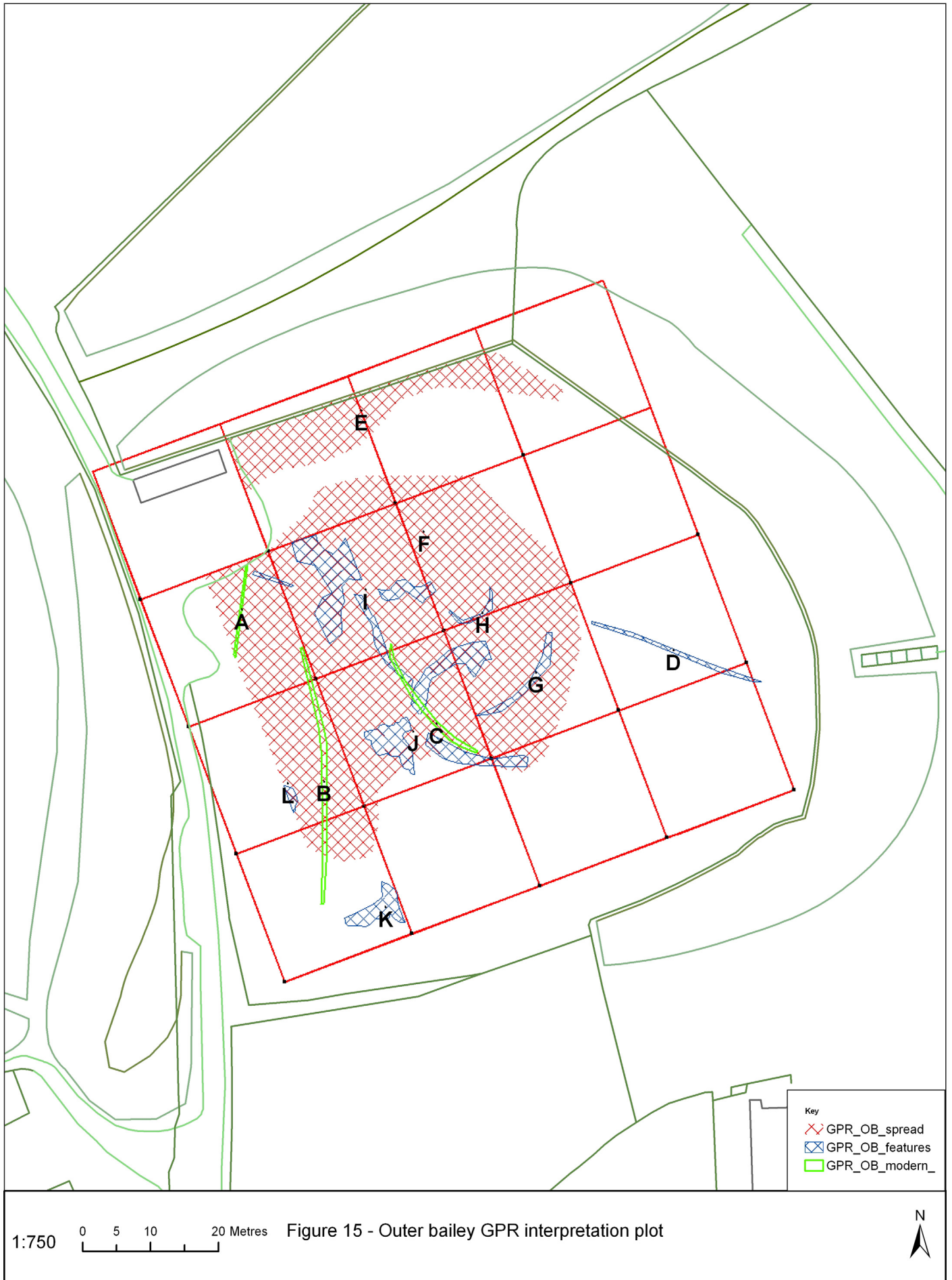


Outer bailey GPR timeslice at a depth of 0.53m showing the feature J as referred to in the text. The horizontal yellow line marks the location of the profile shown below.

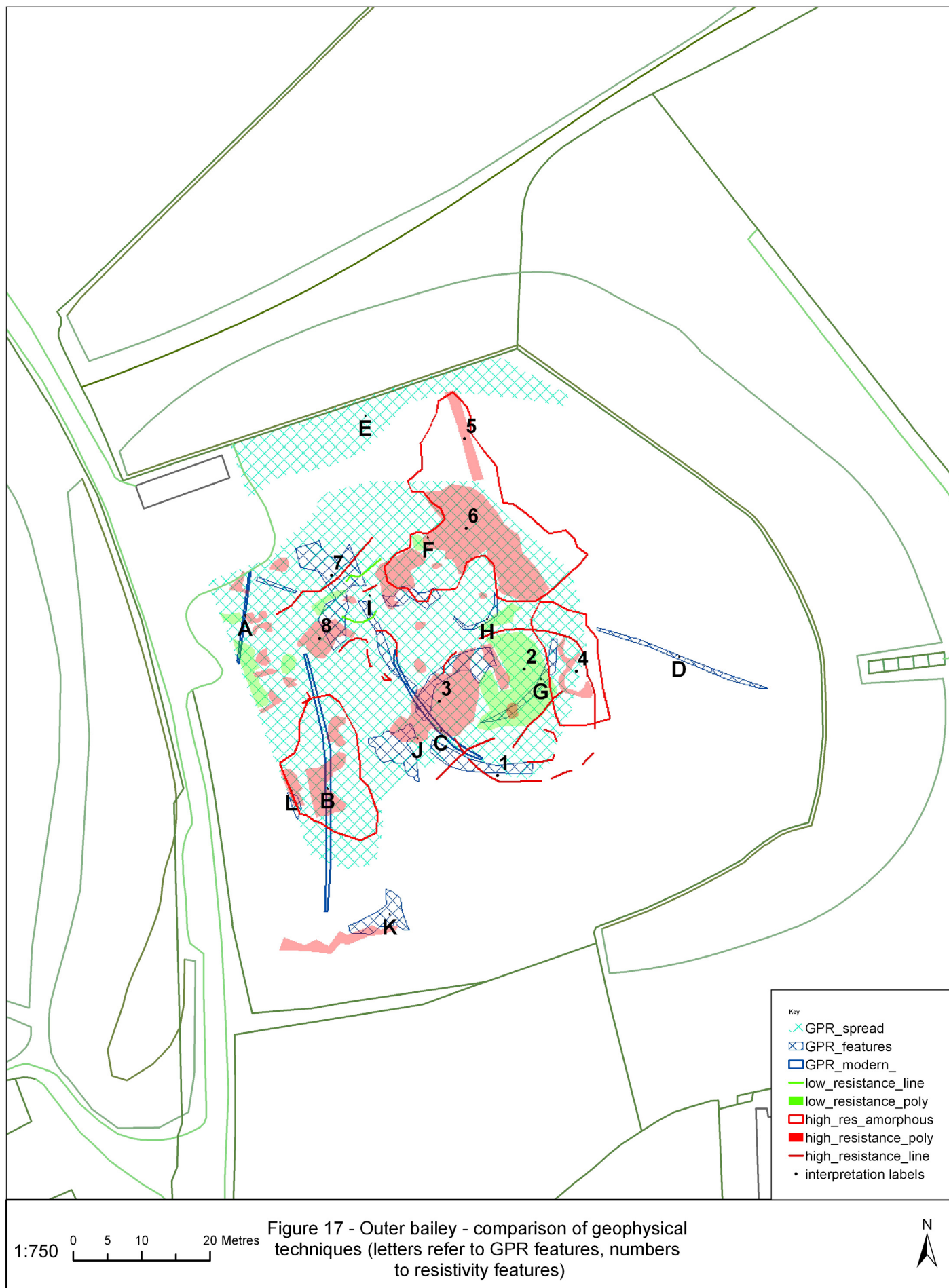


Outer bailey GPR profile showing the feature J as a clearly defined surface response (between the arrows)

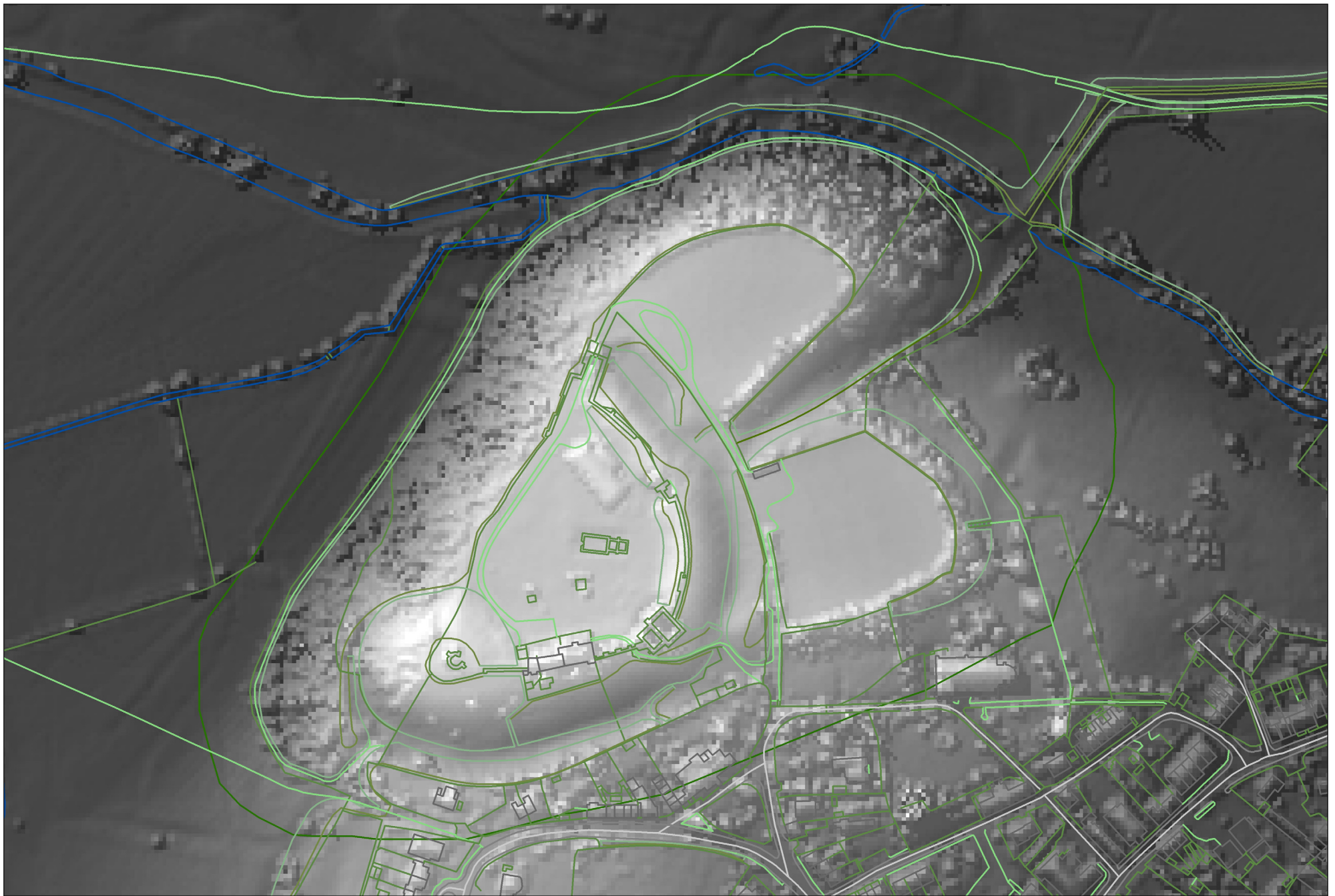
Figure 14 - Outer bailey GPR feature J shown in profile and timeslice form











1:2,500

0 10 20 40 Metres

Figure 19 - LiDAR image overlain with digital Ordnance Survey mapping





Figure 20 - Digital Terrain Model (DTM) showing the results of the topographic survey

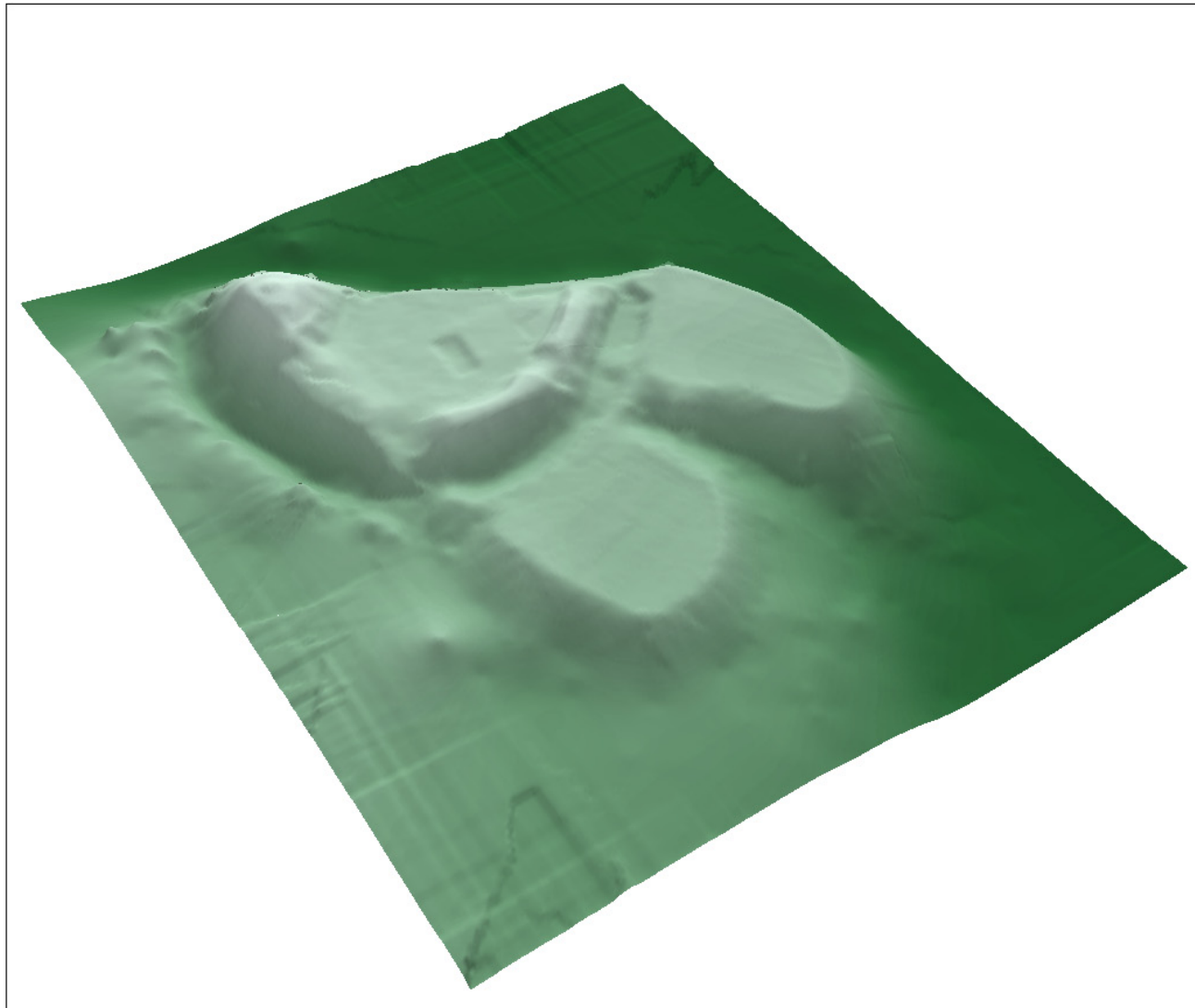
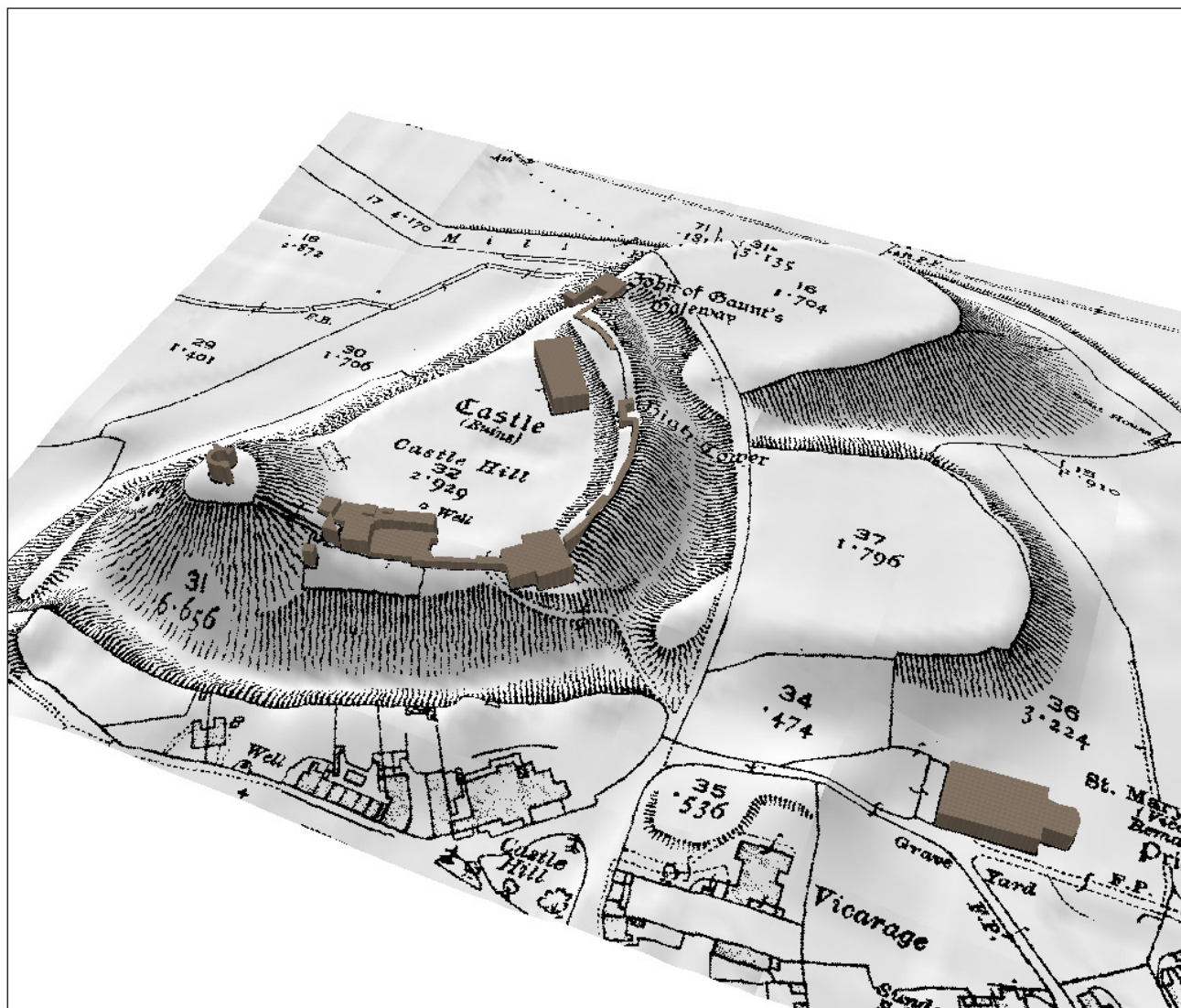


Figure 21 - 3-dimensional Digital Terrain Model (DTM) of topographic survey results (facing northwest)



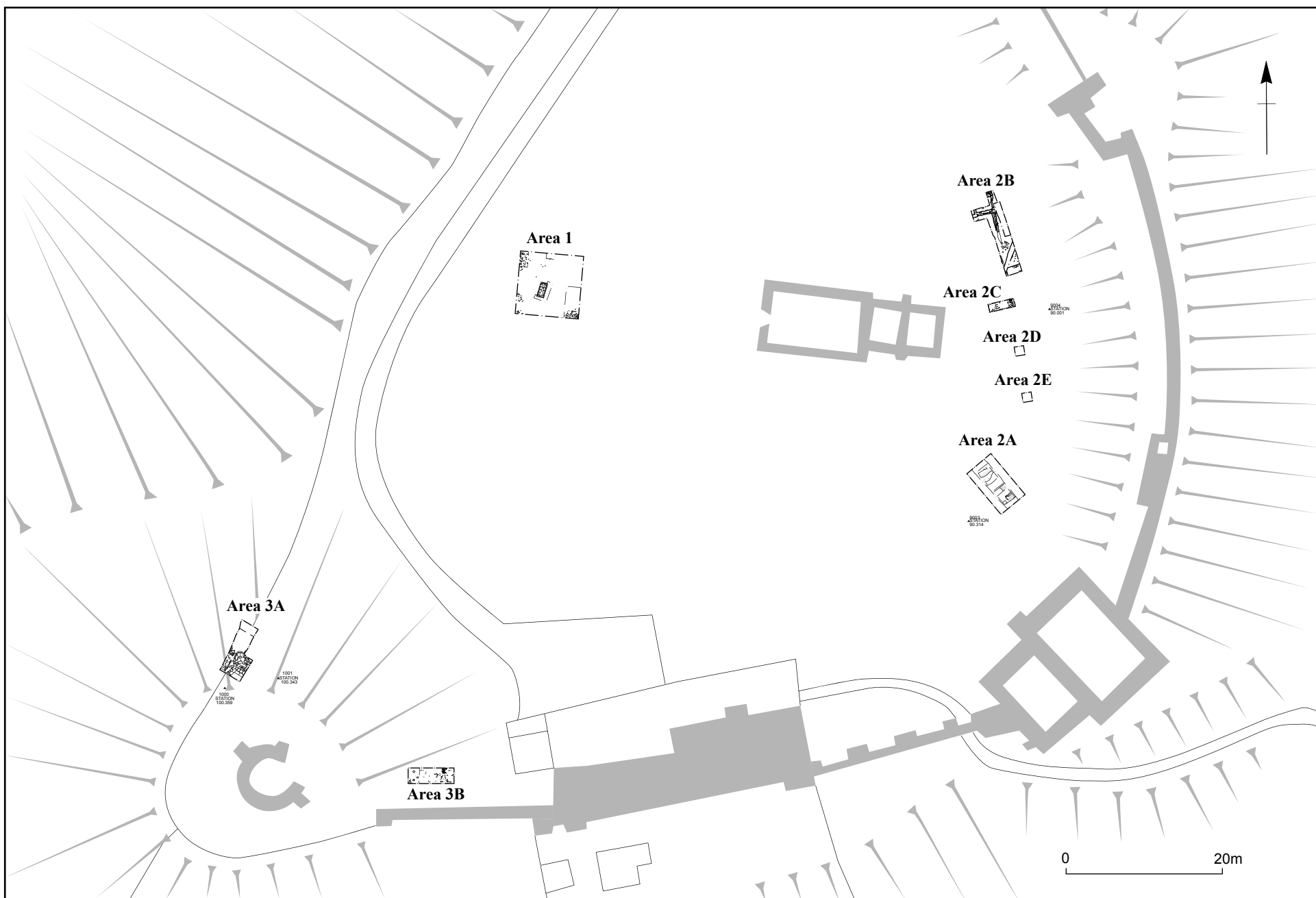
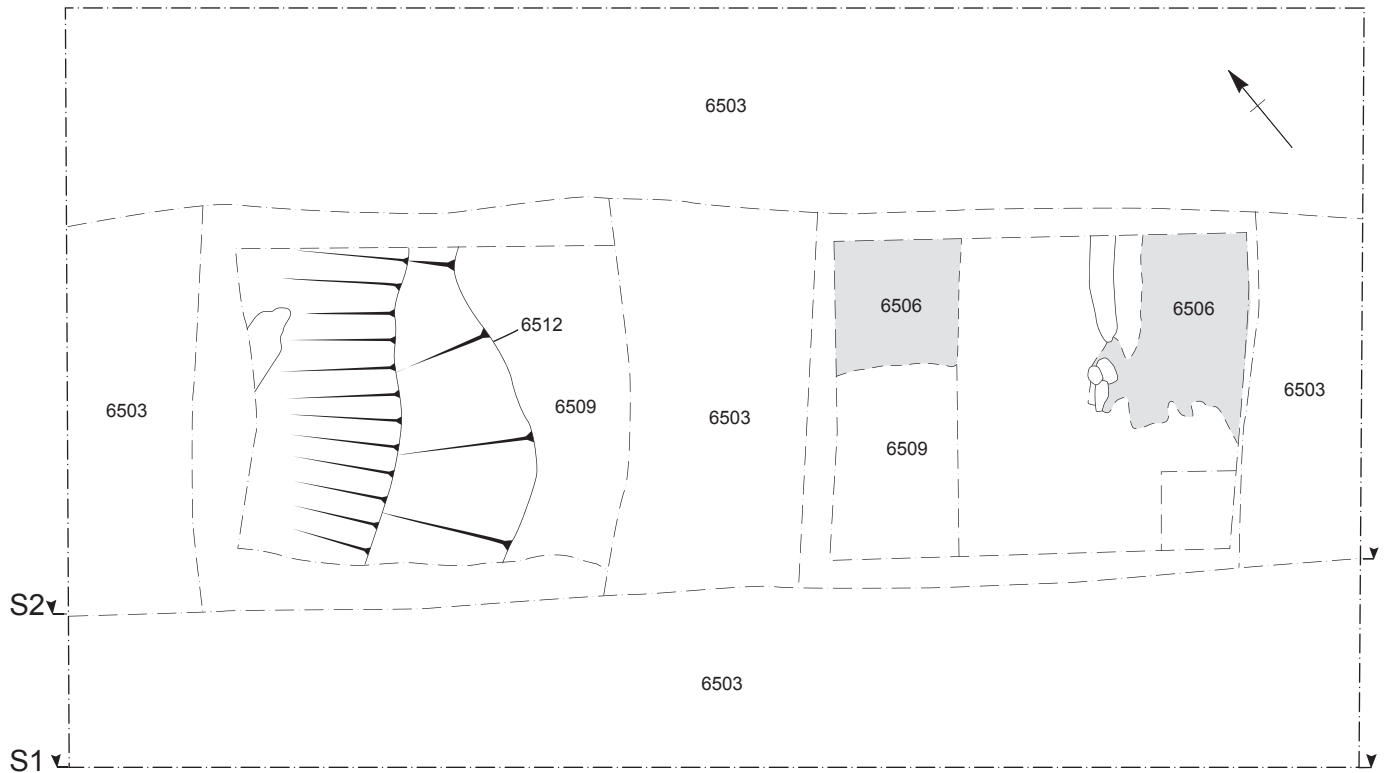


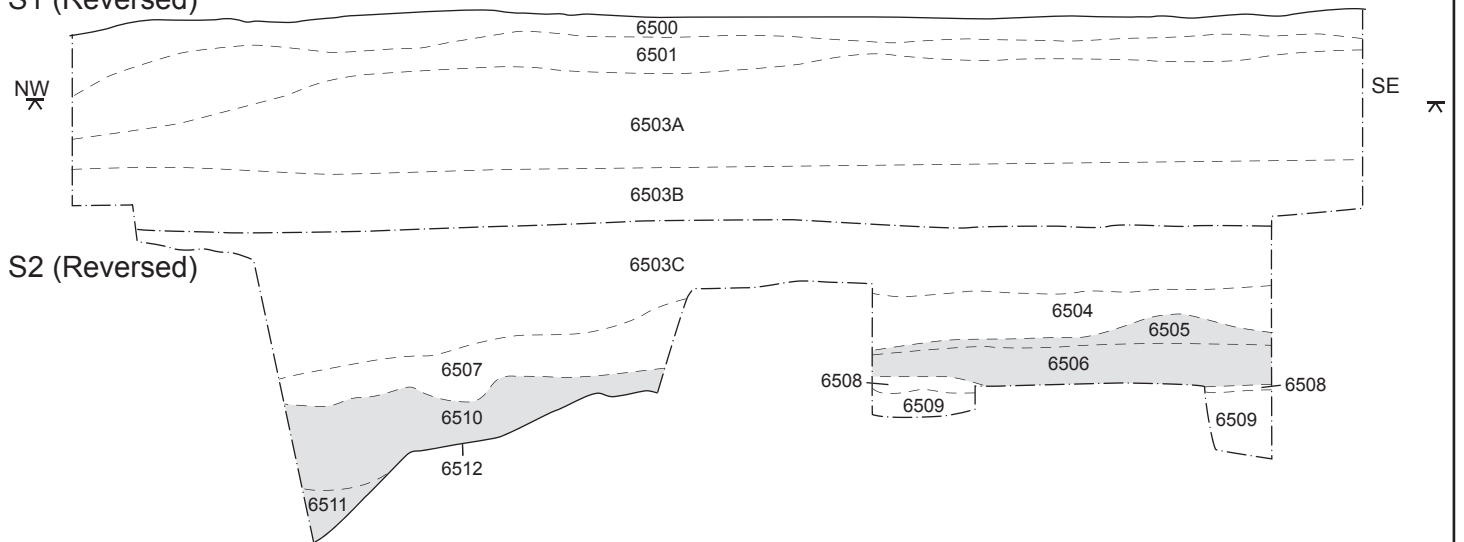


Fig.24

Area 2A



S1 (Reversed)



0 1m

Fig.25

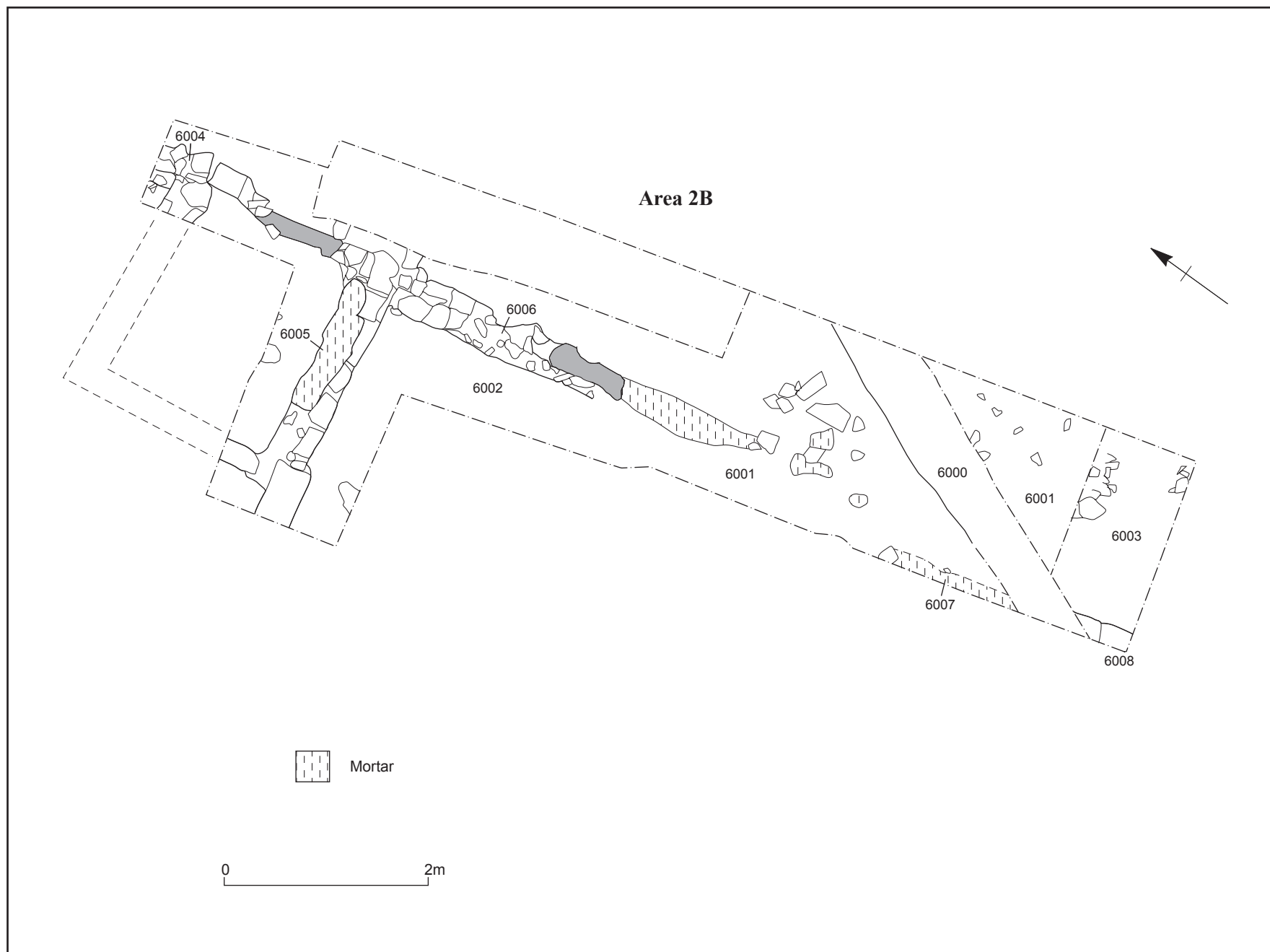


Fig.26

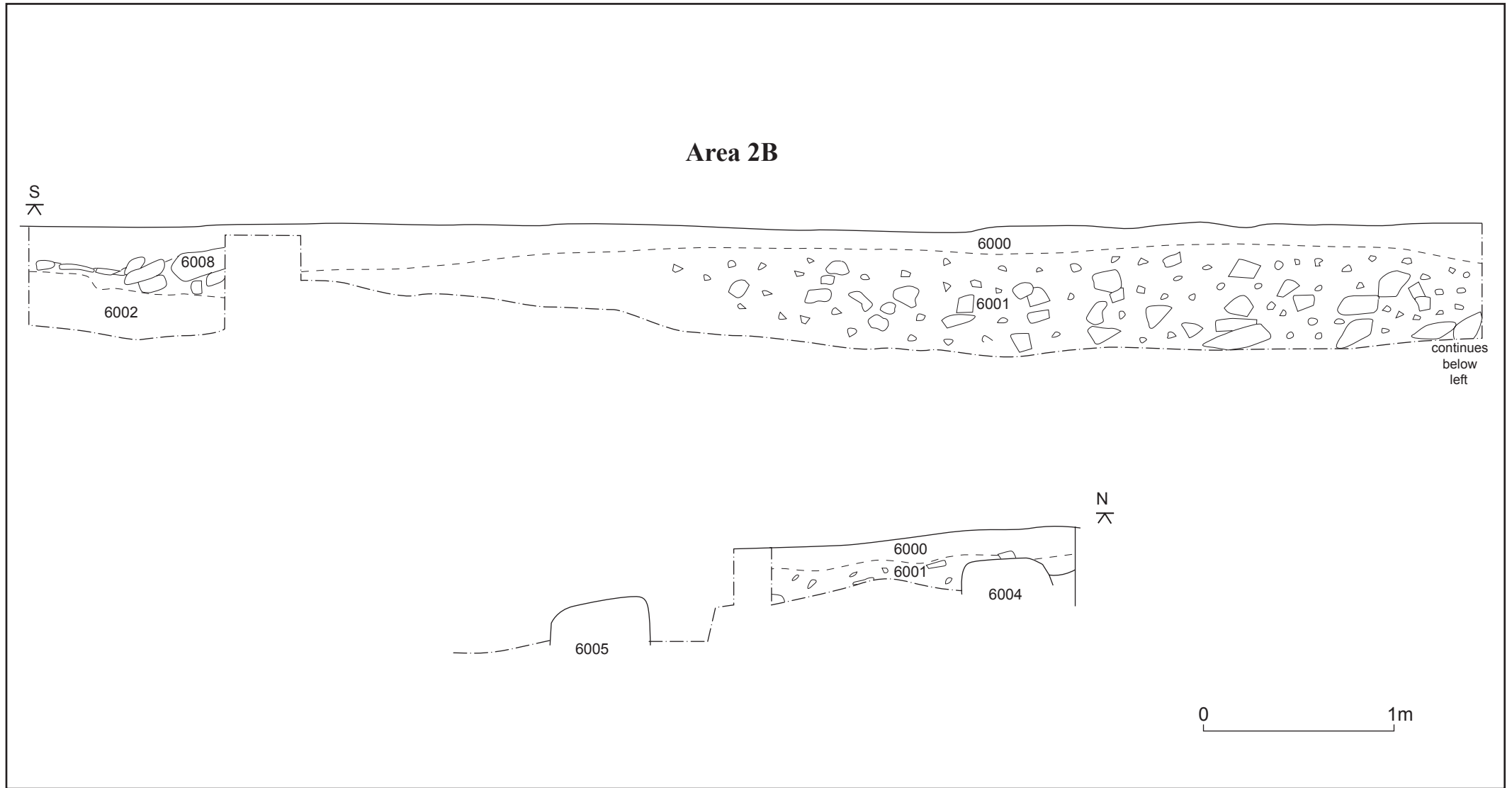


Fig.27

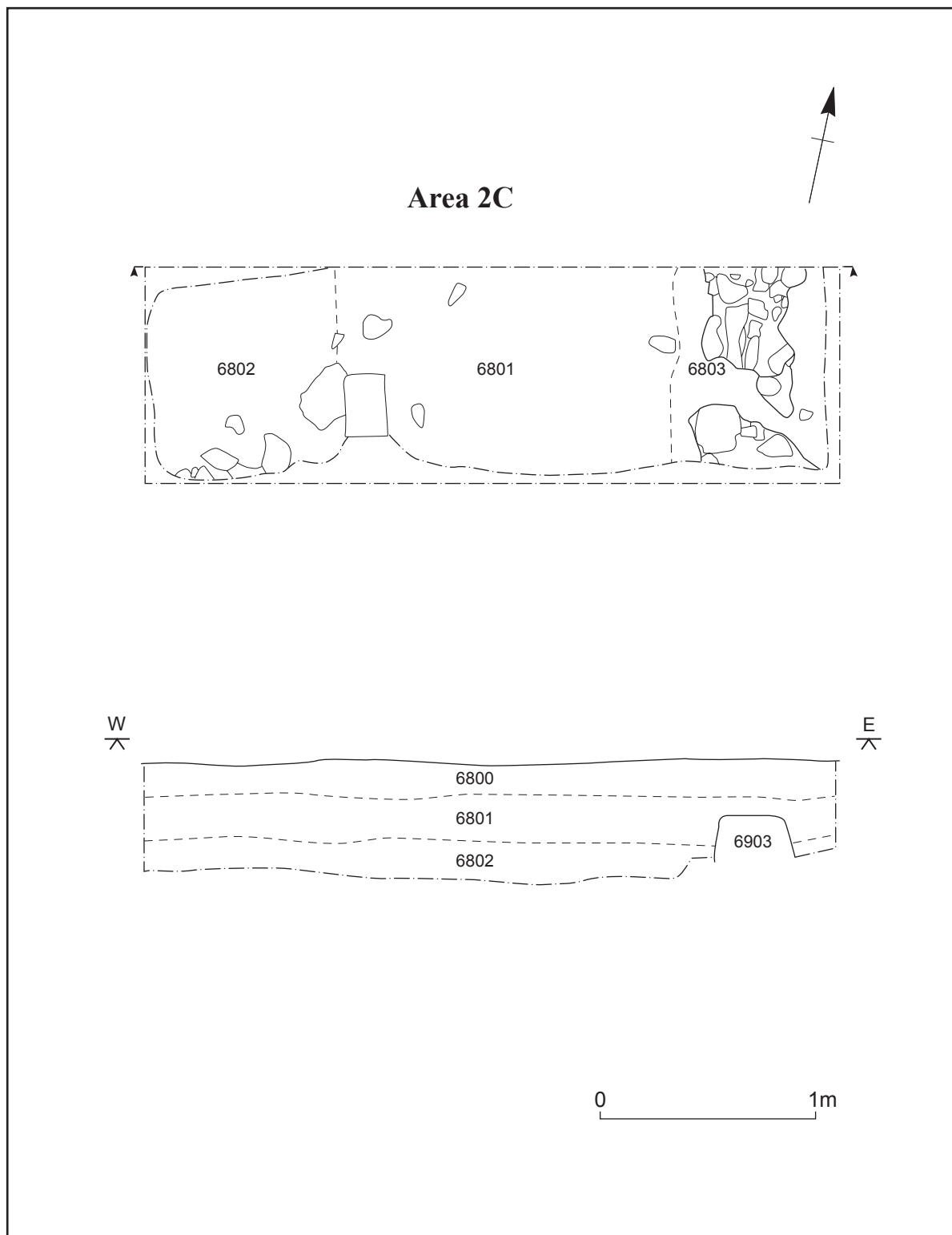


Fig.28

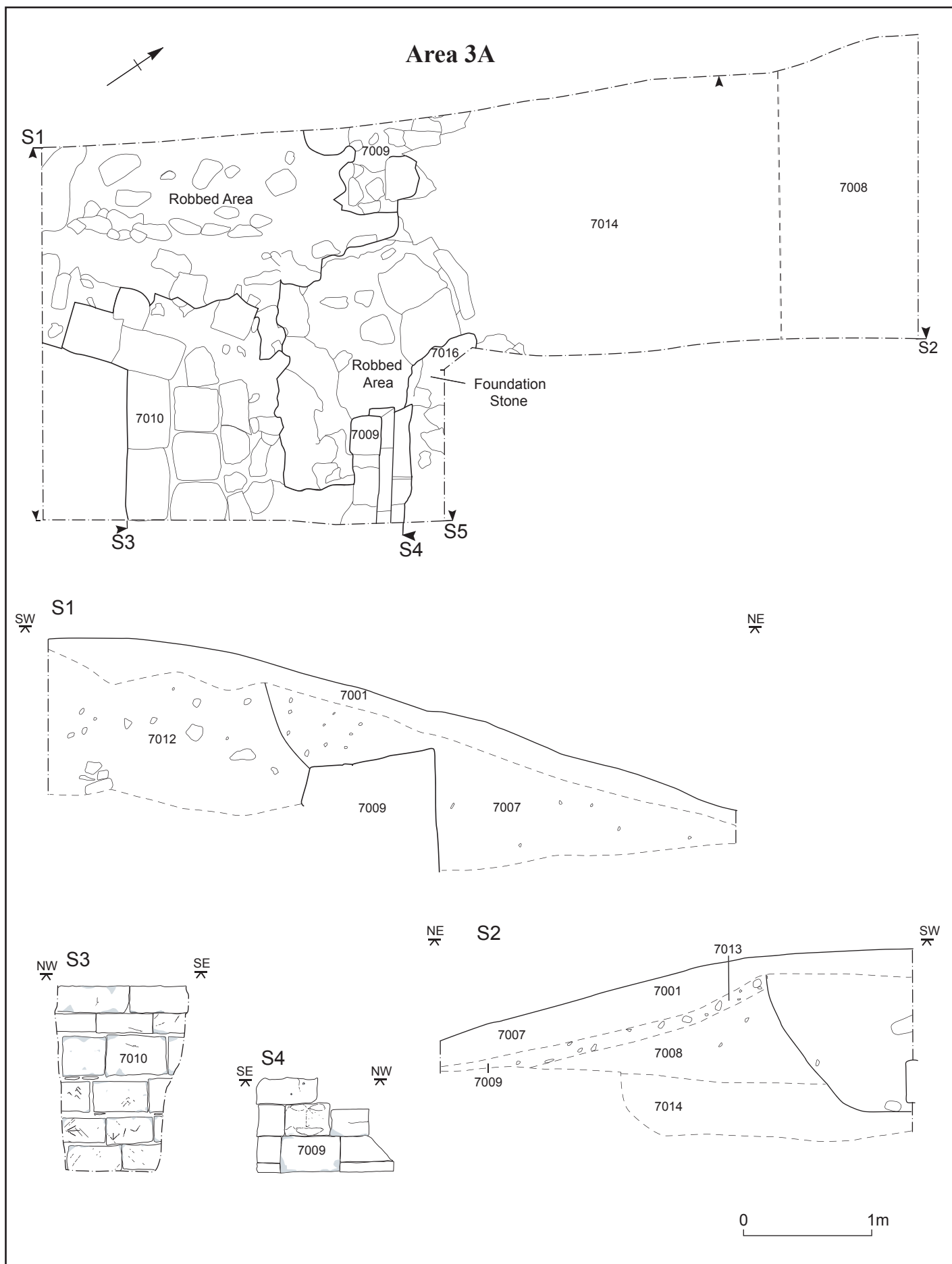


Fig.29

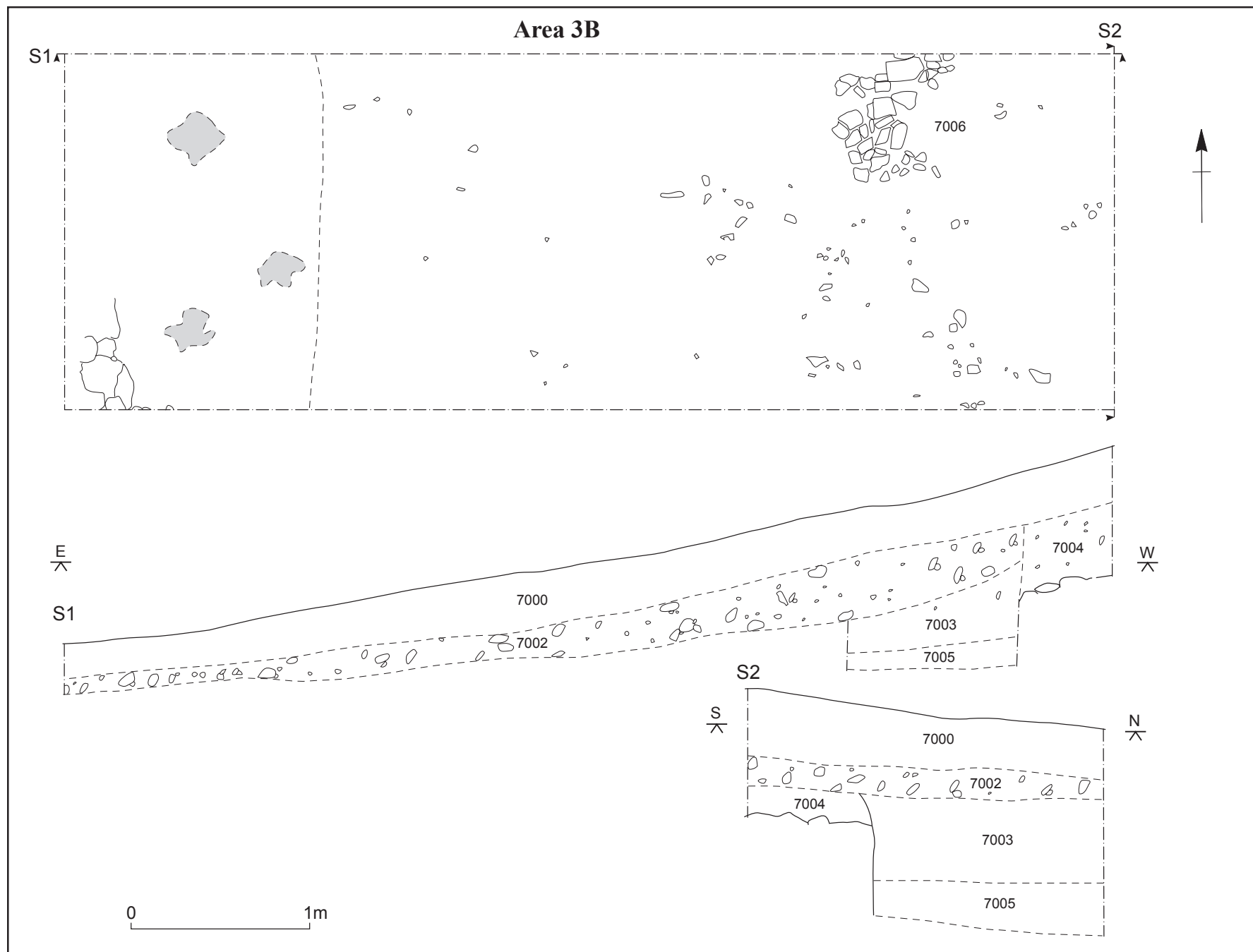


Fig.30

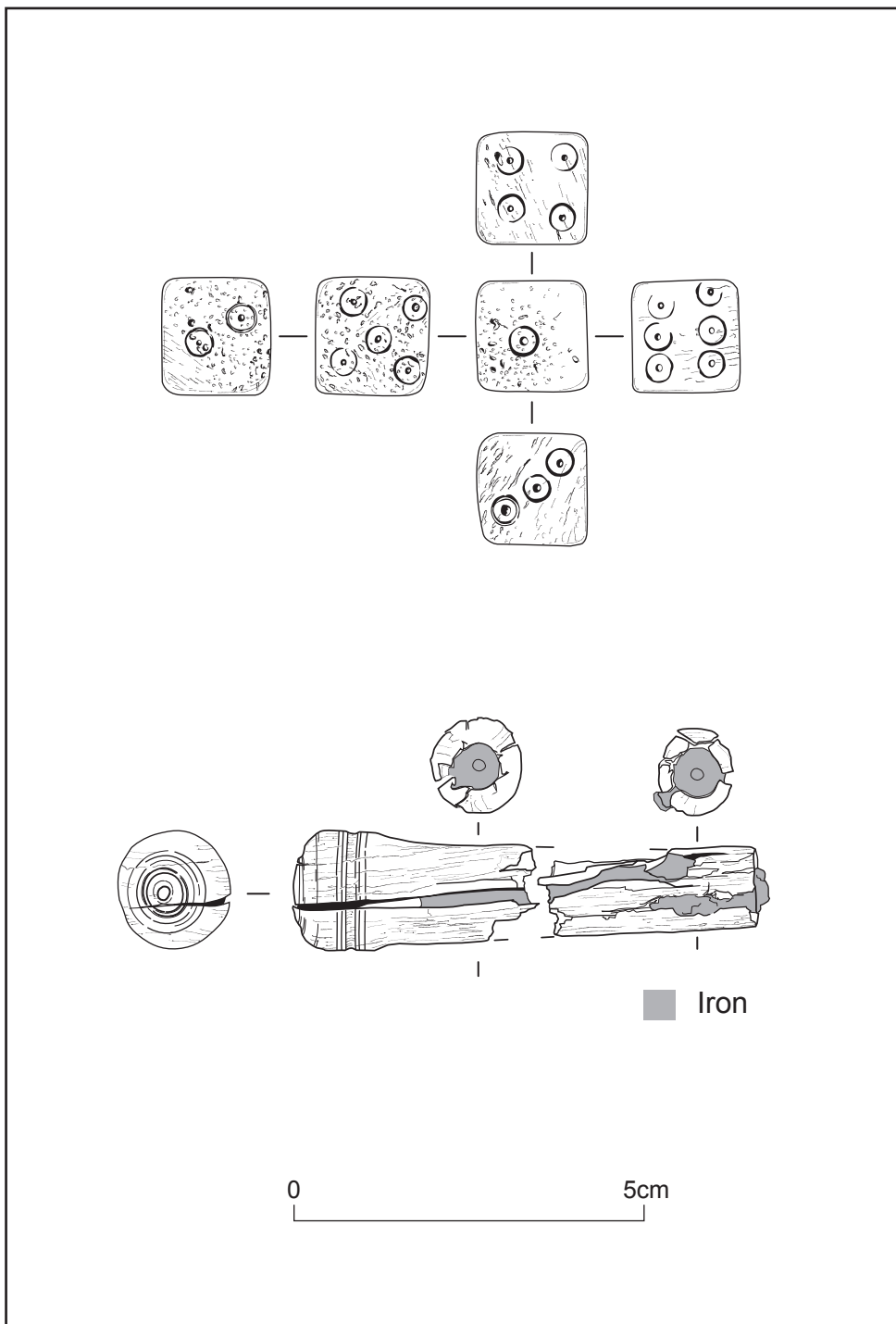


Fig.31



Plate 1



Plate 2



Plate 3



Plate 4



Plate 5



Plate 6



Plate 7



Plate 8



Plate 9



Plate 10



Plate 11



Plate 12



Plate 13



Plate 14



Plate 15



Plate 16



Plate 17

Fabric	5007	5011	6000	6002	6503	6504	6505	6506	6507	6511	6902	7007	Total
post-medieval blackware						1							1
buffw02							8	1					9
buffw02?							1						1
buffw05					2								2
CA01								2					2
cistercian ware							1						1
cistercian/blackware											1		1
post-medieval coarseware					1						1		2
grittyw02				1							13		14
grittyw03				2	1	1	1		1				6
residual medieval			5										5
sand02?						1							1
sand08	1												1
SC01						2	1						3
SC02		1			3	27	20	14	2	1			68
SC03					1	8	7	12	7				35
SC04						13	1						14
Stamford ware				1			9	2	1			1	14
post-medieval yellow ware								1					1
modern glazed ware												1	1
unidentified										1			1
Total	1	1	5	4	8	53	49	32	11	2	15	2	183

Table 1: Fabrics by context (quantification by sherd count)

Fabric	TTD04	TTD05 Tr 1	TTD05 Tr 2	TTD05 Motte	TUT 06
buffw01	3	1			
buffw02	1				10
buffw03		1			
buffw04		1		1	
buffw05					2
ca01			3		2
cistercian ware		1			1
grittyw01	1	1			
grittyw02	6	12	1		14
grittyw03		1		6	6
lrw01		2			
mp01	5	17			
mp02		8			
sand01	1	1	2		
sand02		3			1
sand03		1			
sand04		1			
sand05				1	
sand08					1
sc01	10	4	5		3
sc02	19	6	3		68
sc03	12	6	52		35
sc04					14
Stamford ware	36	3	2		14
ww01		1			
med (unclassified residual)					5
post-medieval					6
unidentified					1
Total	96	71	68	8	183

Table 2: Comparison of pottery assemblages recovered (quantification by sherd count)

Table 3: CERAMIC SUMMARIES BY CONTEXT					
Trench	Context	NoSH	Summary Description	Date	Notes
1	5000	143	Predominantly C19 material, including at least 63 sh of unglazed red earthenware plant pots, some marked. Some of these are well-worn, as are other unglazed redwares which may, or may not be of plant pots. Other C19 ceramics include: WWE, BCH, YLW, BEW, CWE, & GST. Earlier material includes CIST, CEW, MPW, YWE and BSG, the one sherd of which has an applied foliate medallion.	mid - late C19	[Other material includes roof tile, 1 piece of animal bone & non ceramic material.]
1	5001	55	Predominantly mid to later C17 material, including: BLW, BSG (incl. one applied Bartmann face-mask), CIST, YWE, MPW, SLW and TGE. A single WWE plate sherd dates to the mid-late C19, and a worn unglazed red earthenware sherd is probably from a C19 plant pot. Moulded legs in unglazed red earthenware are either from a small toy figure or from a decorative clay tobacco pipe; they are probably of late C19 - early C20 date.	mid - late C17 +	The BLW includes at least one multi-handled cup, while one of 2 SLW sherds is of a press-moulded dish with embossed decoration. One CIST cup has an applied and stamped white clay pad. [Other finds include 1 piece of window glass and 1 tile.]
1	5002	2	Transitional BLW.	early - mid C17	[Also 2 u/d clay pipe stems]
1	5003	3	2 joining sh Cistercian or transitional blackware ?cover & 1 sh Cistercian ware handle	late C16 - mid C17	
1	5016	2	Well-fired sandy sherds look medieval	Medieval	
2F	6000	73	Mixed group of C17 and C19 material with 1 sh of C18 WSG. The C17 wares include Cist, BLW, YLW, SLW, CEW, MPW and BSG. The C19 ceramics include YWE and WWE.	mid C17 - mid C19	Also 2 sh. Roof tile. Non ceramic material includes bottle glass and bone.
2B	6001	331	Large group of largely contemporary material comprising CIST, BLW, CEW, MPW, YLW, SLW, BSG, MCP. There are just 9 sh of C19 ceramics (all WWE)	mid C17 +	Some of MPW/butter pot forms are of Ticknall type. 2 CIST sh with applied white clay decoration may also be from Ticknall; one is an applied pad with a stamped 'star'; the other has applied notched strips. SLW includes thrown dishes with trailed decoration and hollow wares, at least two sherds of which have rudimentary slip dashes (cf. Eccleshall Castle); there is also 1 sh of a press-moulded dish with embossed decoration. 2 sh of BSG have potentially diagnostic applied medallions (fragmentary). [Other material include bottle and window glass, u/d clay pipe stems, roof tile, brick, animal bone & misc. stone.]
2B	6001	5	Sherds which look to be late medieval or earlier		
2E	6002	1	1 yellow ware dish rim {& 1 u/d clay pipe stem]	early - mid C17	
2E	6600	7	6 sh of C17 pottery with 1 mid C19 sherd. The early material comprises MPW, BLW, YWE; the C19 sherd is of YLW	mid C17 +	
2D	6702	5	2 sh Cistercian ware, 1 Cist/transitional BLW, 1 CEW/MPW butter pot & 1 u/gl body	early - mid C17	
2C	6800	42	Group of largely C17 material, inc. Cist, BLW, SLW, YLW, CEW, MPW & TGE, but also with 4 sh of C19 ceramics (WWE & BWE)	early - mid C17 +	
2C	6801	110	Group of largely contemporary material, with just 6 sherds (3 vessels) of mid C19-white ware. The wares are: MPW, including a number of sherds (with joins) from a substantial piece of an MPW jug, as well as butter pot forms; CIST, YWE, BLW, CEW, BSG.	late C16 - early/mid C17	The absence of slipware and the preponderance of Cistercian ware sherds, rather than those in Blackware, argue for a slightly earlier C17-date. A single clay tobacco pipe bowl is an early (i.e. 1640s) form.[Also 1 roof tile, 1 fragment brick, 1 clay tobacco pipe, 2 fragments of window glass, 1 piece of bone, and non artefact stone]
3B	7002	3	1 sh each of CIST/BLW, CEW and WWE	late C19 - mid C19	
TOTAL		782			

Table 4: Finds Catalogue: Metalwork and Misc. Items

Trench	Context	material	wt (g)	description	date range
1	5000	Fe	6	nail - long shank, circular in section, small flat circular head	med - post med?
		Fe	16	nail - large, shank square in section	med - post med?
		Fe	6	nail?	?
		Cu	<1	tin-plated domed finial/cap	20th century
		Cu	6	circular decorative furniture (?) fitting - mother of pearl (?) inlay, inset felt pad and screw to rear	20th century
	5001	Fe	44	rowel spur - horizontally straight sides of flattened D section, terminal survives on one side, downward bent rowel box	17th-19th century
		Pb	6	header with 6 runners spaced at 4-5mm intervals	17th century
		Pb	124	rod, circular in section, curved and flared at one end	?
	5011	bone	6	cubical die with values in non-regular layout represented by drilled holes at	medieval - 13th century-late med
	?	Cu	40	square-sectioned rod, tapers towards one end which is flattened	?
2A	u/s	Fe	14	nail - long shank, circular in section, small flat circular head	?
2B	6000	Fe	32	nails - long shanks, circular in section, with small flat circular heads	med - post med?
		Fe	2	nails - short with small flat circular heads	med - post med?
		Fe	6	nails - badly corroded	med - post med?
		Fe	28	nails - short, shanks square in section?	med - post med?
		Fe	10	nail?	?
		Fe	14	strip, D-shaped in section and bent upwards at one end	?
		Fe	16	skewer	post med
		Fe	<1	wire	?
		Pb	<1	folded lead sheet	?
		Pb	10	came, milled - 1mm spaced reeding	post med
		Pb	24	came, milled - no reeding	late med - early post med
		Pb	<1	thin lead strip - came?	?
		Pb ?	<1	band with small opposing lugs	20th century?
		Cu	<1	finger ring, interlaced band, empty setting in oval bezel with pelleted edge	post med - 19th century?
	6001	Fe	26	nails - square in section	med - post med?
		Fe	8	nails - small flat circular heads, shanks circular in section?	med - post med?
		Fe	16	nails ? - badly corroded	?
		Fe	8	structural ironwork?	?
		Fe	10	small, curving iron strip, rectangular in section - heel iron?	post med?
		Fe	120	large, curving iron strip, rectangular in section - horse shoe?	post med?
2B	6001	Fe	14	small knife, blade triangular in section, whittle tang rounded in section	late med - post med (c.15th-17th century)
		Pb	70	lead fragment	?
		Pb	24	roughly circular lead fragment with four lateral perforations	?
		Pb	6	lead strip	?
		Pb	6	came, milled - 1mm spaced reeding	post med
		Pb	6	shot - dia. 15mm. Unusually light - probably has hollow centre	17th century
		Pb	32	shot - dia. 18mm	17th century
		Cu	<1	strip, bent over at one end, 2-3 perforations along one edge, small hinge-like fitting at bent end	post-med?
		bone/Fe	14	knife handle decorated with turned bands and drilled hole at proximal end. Fe whittle tang is present - circular in section	17th century?
?	6506	bone	16	worked bone tool, ovate in section, smoothed surface, pointed at one end	?
2C	6800	Fe	68	structural ironwork?	cramp/ staple?
		Pb	6	came	post med
		Pb	2	came, milled - 1mm spaced reeding	post med
	6801	Fe	16	nails - badly corroded	med - post med?
		Fe	12	nails - square-sectioned shanks	med - post med?
		Fe	<1	D-Shaped loop	20th century
		Pb	4	came, milled - 2mm spaced reeding	post med?
2	dark middle layer (top of wall?)	Fe	2	nail - short shank, square in section	med - post med?
		Fe	16	thin strip, rectangular in section	?
		Pb	<1	came	post med
	dark earth sealing rubble	Pb	<1	came, milled - no reeding	post med
3A	7007	Pb	96	triangular fragment	?
chapel spoil	u/s	Fe	54	tapered, rectangular in section, possible lateral rivet at each end	post med?
		Fe	12	thin tapered iron fragment, rectangular in section	?
		Fe	24	nail - badly corroded	med - post med?
		Fe	6	nail?	?
		Fe	6	flat, T-shaped iron fragment, rectangular in section	?
chapel spoil	u/s	Pb	156	folded strip	?
		Pb	28	shot, dia. 16mm, slightly flattened on one side	17th century
		Pb	28	shot, dia. 17mm, slightly flattened and distorted on one side	17th century
		Pb	22	shot, dia. 15mm, slightly flattened on one side	17th century
		Slate	<1	pencil	19th century
	u/s	Pb	30	shot - dia. 16mm	17th century
		Pb	24	shot - dia. 15mm	17th century
		Pb	14	shot - dia. 13mm	17th century
		Total	1423		

Table 5: Finds Catalogue: Glass

Trench	Context	wt (g)	colour	form	date range	notes
1	5000	324	clear	bottle/jar	late 19th-early 20th century	includes fragments of wide-mouthed, continuous external thread lip
		80	pale aqua	bottle	mid 19th-early 20th century	includes fragment of blob lip
		<1	medium olive green	bottle	19th century	
		<1	dark olive green	bottle	19th century	
		<1	blue	bottle	19th century	
		<1	green	window	med - post med?	
		<1	aqua	window	med - post med?	
	5001	8	green	window	med - post med?	
		16	green	window	med - post med?	
		6	clear	window	20th century	
		<1	?	window	med-post med?	
		<1	?	window	med-post med?	
		<1	pale green	bottle	19th century	
2A	u/s	12	clear	bottle	19th century	
		6	amber	bottle	19th century	
		6	aqua	window	med - post med?	thin - <1mm thick. Diamond shape
		8	aqua	window	med-post med?	fairly thick (possible edge) - 2-3mm.
2B	6000	6	green	window	med - post med?	1mm thick at most.
		<1	green?	window	med - post med?	1.5mm thick. Badly corroded
		4	?	window	med-post med?	
		40	clear	bottle	19th century - 1850+	one embossed example; one mineral or 'double oil' lip fragment
		6	clear	globular stopper	19th century	
		4	clear	vessel - glass	19th century	
		12	medium olive green	bottle?	19th century	
		<1	green?	?	19th century	
		52	dark olive green	bottle	19th century - 1850+	includes two fragments of mineral or 'double oil' lip
		28	pale olive	window	med-post med?	one fragment appears intact - triangular
		10	aqua	window	med - post med?	
		8	green	window	med - post med?	crown glass?
	6001	<1	clear	window	20th century	
		28	?	window	med-post med?	
2B	6001	78	clear	decanter/bottle	late 19th -early 20th century	
		8	clear	Codd's stopper	late 19th century	
		8	clear	vessel?	19th century?	geometric molding
		32	medium olive green	bottle	19th century	
		14	dark olive green	bottle	19th century - 1850+	includes mineral or 'double oil' lip fragment
		<1	green	bottle	19th century	embossed lettering
		<1	pale green	flask?	post-med?	
		<1	medium green	bottle	19th century	one fragment features embossed lettering
		68	aqua	bottle	mid 19th-early 20th century	includes fragments of blob lip
		6	aqua	marble	20th century	
		<1	blue	bead?	?	
	6800	4	aqua	window	post med?	
		6	?	window	med-post med?	
		18	clear	bottle	19th century	
		<1	?	bottle	19th century	
2C	6801	6	green	window	med-post med?	
		2	aqua	window	med-post med?	
		8	?	window	med-post med?	
		<1	green	flask?	post med?	
		<1	pale olive green	vessel?	post med?	mould blown, reeded exterior
		<1	aqua	window	med-post med?	
	Dark earth sealing rubble	<1	clear	window	20th century	
		4	clear	bottle	19th century	
		<1	medium green	bottle	19th century	
		<1	dark olive green	bottle	19th century	
2D	6702	<1	green	window	med-post med?	
	Misc.	<1	green	window	med-post med?	
		2	?	window	med-post med?	
2	dark middle layer	8	clear	bottle	19th century	
		8	clear	Codd's stopper	late 19th century	
		10	pale green	bottle	19th century	
		26	medium green	bottle	19th century	
2E	6600	<1	clear	?	19th century?	
2E	6602	<1	?	window	med-post med?	
3A	7007	8	clear	bottle	19th century	
3B	7002	28	clear	bottle	late 19th-early 20th century	square/ rectangular bottle with embossed lettering on base - no seam visible
		48	clear	bottle	19th century	includes one fragment of square/rectangular (medicine?) bottle
	?	8	clear	bottle	19th century - 1850+	mineral or 'double oil' lip
		24	clear	bottle	2nd half 19th century	embossed base - no seam visible
		16	clear	bottle	2nd half 19th century	rectangular bottle, embossed base - no seam visible
		26	clear	globular stopper	19th century	
		64	dark green	bottle	1st quarter 20th century	neck and mineral or 'double oil' lip - machine made with offset seam
		4	pale green	bottle	19th century	
		<1	green	window	med-post med?	
		<1	aqua	window	med-post med?	
		<1	?	window	med-post med?	
		10	clear	bottle	19th century	
?		18	clear	globular stoppers	19th century	
		26	pale aqua	bottle	19th century	
		2	medium aqua	?	post-med	
		<1	?	window	med-post med?	
chapel spoil	u/s	<1	?	window	med-post med?	
Total		1292				

Table 6 : Species Representation (fragment count)

Species	12th C	%	15-16th C	Medieval	L16 - L19th C	%
Cattle	56	16.8	19		59	46.5
Sheep / goat	65	19.5	15	2	42	33.1
Sheep	7	2.1			2	1.6
Goat	1	0.3				
Pig	149	44.6	18	1	10	7.9
Horse	1	0.3			1	0.8
Dog	1	0.3			1	0.8
Chicken	15	4.5	2		3	2.4
Goose	11	3.3	1		4	3.1
Duck	3	0.9				
Other Bird	4	1.2				
Deer					2	1.6
Fallow Deer					1	0.8
Red Deer	16	4.8	2			
Roe Deer	3	0.9	1			
Rabbit	2	0.6			1	0.8
Hare					1	0.8
Total Identified	334		58	3	127	
Unidentified Large Mammal	86		32	2	101	
Unidentified Mammal	34		15		151	
Unidentified Medium Mammal	334		26	6	105	
Unidentified Bird	29		2		4	
Unidentified Fish	3					
Total	820		133	11	488	

Table 7 : Comparison of restricted (epiphysis) and fragment counts

Species	12th C				L16-L19th C			
	Epiphysis	%	Fragment	%	Epiphysis	%	Fragment	%
Cattle	12	13	56	17	16	41	59	46
Sheep / Goat	20	21	73	22	12	31	44	35
Pig	22	23	149	45	3	8	10	8
Horse	1	1	1	-			1	-
Dog			1	-			1	-
Deer	8	8	19	6	1	3	3	2
Other Mammal	2	2	2	1	3	8	2	2
Chicken	14	15	15	5	2	5	3	2
Goose	7	7	11	3	2	5	4	3
Other Bird	9	9	7	2				
Total	95		334		39		127	

Table 8: Comparison of 2005 and 2006 species proportions (fragment counts)

Species	11-12th C				L16-19th C			
	2005	%	2006	%	2005	%	2006	%
Cattle	32	30	56	17	216	36	59	46
Sheep / Goat	15	14	73	22	184	30	44	35
Pig	42	40	149	45	71	12	10	8
Horse	2	2	1	-	4	1	1	-
Dog			1	-	32	5	1	-
Deer	6	6	19	6	23	4	3	2
Other Mammal	1	1	2	1	9	1	2	2
Chicken	3	3	15	5	39	6	3	2
Goose	2	2	11	3	13	2	4	3
Other Bird	3	3	7	2	14	2		
Total	106		334		605		127	

Table 9: Carcass part representation (Epiphysis count)

Anatomy	12th C			15-16th C			L16 - L19th C		
	Cattle	Sheep/Goat	Pig	Cattle	Sheep/Goat	Pig	Cattle	Sheep/Goat	Pig
Metacarpal P*	1		1				2	1	
Metatarsal P*			4				1	1	
Metacarpal D*			1					1	
Metatarsal D*			3						
1st phalange **		1	2	1			1		
2nd phalange **		1					1		
3rd phalange **									
Scapula D		2	2			1	1	1	
Humerus D	1	3	1	2	1		1	2	
Humerus P									
Radius P		3	2				2	2	
Radius D		2	1		1		1	1	
Pelvis	1		1	1		1	2	1	1
Femur P	1	1		1			1	1	
Femur D	2	1	1		1	1			
Tibia D	2	2	2		1	2	1		
Tibia P	2								
Calcaneum	2	2	1		1		1	1	2
Atlas	2								
Sacrum	2								
Zygomaticus			1						
Frontale			3						
Horn core									
Mandible ***		2	6						

* Pig 3rd metapodials only included

** bone count adjusted to compensate for frequency of phalanges in relation to other bones

*** mandibles with molars

Table 10: Fusion Data. Cattle

Bone	AGE (months)	12th C			15-16th C		L16 - L19th C		
		U	F	%	U	F	U	F	%
Metacarpal P	0		1	100			2		100
Metatarsal P	0						1		100
Scapula	7-8						1		100
Pelvis	7-10		1	100		1	2		100
1st phalange	13-15					1	1		100
Humerus D	15-18		1	100		2	1		100
Radius P	15-18						2		100
2nd phalange	18						1		100
Metacarpal D	24-36								
Tibia D	24-30		2	100			1		100
Metatarsal D	27-36								
Calcaneum	36-42	1	1	50			1		100
Ulna	42						1		100
Femur P	42		1	100	1		1		0
Humerus P	42-48								
Radius D	42-48						1		0
Femur D	42-48	1	1	50					
Tibia P	42-48	1	1	50					
Total		3	9		1	4	1	15	

Table 11: Fusion Data. Sheep

Bone	AGE (months)	12th C			15-16th C		L16 - L19th C		
		U	F	%F	U	F	U	F	%
Metacarpal P	0						1		100
Metatarsal P	0						1		100
Scapula	6-8	1	1	50			1		100
Pelvis	6-10						1		100
Humerus D	10	1	2	67		1	2		100
Radius P	10		3	100			2		100
1st phalange	13-16		1	100					
2nd phalange	13-16		1	100					
Metacarpal D	18-24						1		100
Tibia D	18-24		2	100		1			
Metatarsal D	20-28								
Ulna	30	1	1	50					
Femur P	30-36		1	100			1		100
Calcaneum	30-36	1	1	50		1	1		100
Radius D	36		2	100		1	1		0
Femur D	36-42		1	100		1			
Tibia P	36-42								
Humerus P	36-42								
Total		4	16		0	5	1	11	