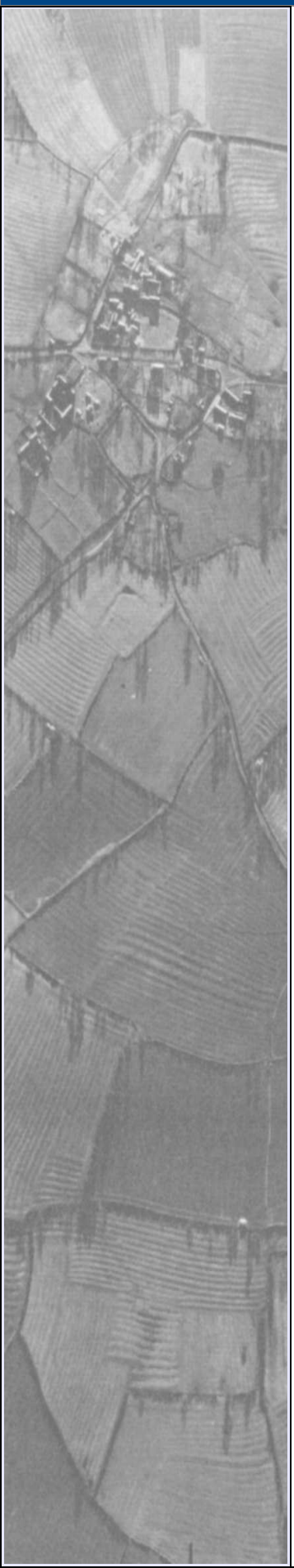


Bagot's Castle
Baginton
Warwickshire

GROUND PENETRATING RADAR SURVEY REPORT

for

Warwickshire Wildlife Trust and Bagot's Castle

David Sabin and Kerry Donaldson

October 2020

Ref. no. J829

ARCHAEOLOGICAL SURVEYS LTD

Bagot's Castle
Baginton
Warwickshire

Ground Penetrating Radar Survey Report

for

Warwickshire Wildlife Trust and Bagot's Castle

Fieldwork by David Sabin (Hons) MCIfA
Report by David Sabin
Report checked by Kerry Donaldson BSc (Hons)

Survey date - 18th August 2020
Ordnance Survey Grid Reference - **SP 34095 74745**

Archaeological Surveys Ltd
1 West Nolands, Nolands Road, Yatesbury, Calne, SN11 8YD
Tel: 01249 814231 Fax: 0871 661 8804
Email: info@archaeological-surveys.co.uk
Web: www.archaeological-surveys.co.uk

CONTENTS

LIST OF FIGURES

LIST OF PLATES

LIST OF TABLES

LIST OF RADARGRAMS

SUMMARY

Archaeological Surveys Ltd was commissioned to undertake a ground penetrating radar survey over part of the castle enclosure at Bagot's Castle, Baginton, Warwickshire where medieval remains are believed to be buried under 18th century landscaping. The work formed part of the Warwickshire Wildlife Trust's National Lottery Heritage Fund-supported Dunsmore Living Landscape scheme. The results of the survey demonstrate useful reflections recorded down to a depth of approximately 3m with several sloping and horizontal layers representing the subsurface make-up. In the north east part of the survey area a horizon at approximately 1m below the current ground level may represent the former medieval surface but the layers slope down to a depth of over 2m towards the southern edge of the area. A broad, curving, linear anomaly could be consistent with a substantial wall, possibly the curtain wall to the castle enclosing an area much smaller than that of the current enclosure. Several weak and fragmented linear anomalies and small patches of response may possibly indicate a former medieval structure and associated layer, but this interpretation is tentative. Several linear anomalies and broad features are considered likely to relate to 18th century landscaping and possibly a former bowling green. A light railway system and turntable, used to remove spoil from 1930s excavations, was also located.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Warwickshire Wildlife Trust's National Lottery Heritage Fund-supported Dunsmore Living Landscape Scheme, to undertake a ground penetrating radar survey (GPR) at Bagot's Castle, Baginton, Warwickshire. The work was a collaboration between the Trust, Bagot's Castle and the landowner, Mr David Hewer.

1.1.2 The site is a scheduled monument (no. 1011193) and the survey was carried out under a Section 42 Licence, case no. SL00234011, issued by Neil Rimmington, Inspector of Ancient Monuments for Historic England, on the basis of a proposal prepared on behalf of Bagot's Castle by Nicholas Palmer (Palmer, N, *Bagot's Castle, Baginton, Warwickshire, Proposed ground penetrating radar survey v2.0* of July 2020). Archaeological Surveys Ltd were the nominated contractor.

1.1.3 The surviving remains of Bagot's Castle consist of the basement of a late 14th century tower believed to have been built on the site of an earlier castle. The basement was excavated in the 1930s (Chatwin, 1947; Edwards, 1951); the ruins were consolidated in 2011 (Palmer, 2012) and the site is open to the public. Previous geophysical work took place in 2017 (Ainslie, 2017).

1.2 Survey objectives and techniques

1.2.1 The aim of the survey was to use GPR to locate geophysical anomalies that may be archaeological in origin in an area of the castle buried by 18th century landscaping as part of further investigations into the former layout of the site. Specific objectives were to locate the putative northern arm of the castle ditch, trace any surviving curtain wall and locate any medieval buildings.

1.2.2 The methodology is considered an efficient and effective approach to archaeological prospection. GPR survey can be particularly effective at locating formal structural remains especially where there is deep overburden and several periods of site activity.

1.2.3 Geophysical survey can provide useful information on the archaeological potential of a site; however, the outcome of any survey relies on a number of factors and as a consequence results can vary. The success in meeting the aims and objectives of a survey is, therefore, often impossible to predetermine.

1.3 Standards, guidance and recommendations for the use of this report

1.3.1 The survey and report follow the recommendations set out by: European Archaeological Council (2015) *Guidelines for the Use of Geophysics in Archaeology;* Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations.* The work has been carried out to the Chartered Institute for Archaeologists (2014) *Standard and Guidance for Archaeological Geophysical Survey.* Note: currently Historic England (2018) no longer support the guidelines set out in English Heritage (2008) *Geophysical survey in archaeological field evaluation* and there are currently no plans to update the document. As a consequence other sources of written guidance referring to this document may be out of date and/or contain unsupported information (e.g. Chartered Institute for Archaeologists, 2014).

1.3.2 Archaeological Surveys Ltd carries out ground penetrating radar surveys under a Wireless Telegraphy Act licence from Ofcom (No. 078907/01). It is operated in accordance with Ofcom regulations (OfW 350 Requirements and Guidance Notes for Ground Probing Radar).

1.3.3 Archaeological Surveys Ltd provide a detailed geophysical survey report and it is recommended that where possible the contents should be considered in full. The Summary provides a brief overview of the results with more detail available in the Discussion and/or Conclusion. The *List of anomalies* within the Results provides a detailed assessment of the anomalies within separate categories which can be useful in inferring a level of confidence to the interpretation. Quality and factors influencing the interpretation of anomalies is also set out within the results.

1.3.4 It is recommended that the full report should always be considered when using data and interpretation plots; where this is not possible, in the field for

example, the abstraction and interpretation plots should retain their colour coding and be used with a corresponding legend.

1.4 Site location, description and survey conditions

1.4.1 The site is located at Bagot's Castle, Baginton, Warwickshire. It is centred on Ordnance Survey National Grid Reference (OS NGR) SP 34095 74745, see Figs 01 and 02.

1.4.2 The geophysical survey covers approximately 1322m² across a mown flat terrace area immediately to the west of the tower at Bagot's Castle. The survey was constrained by steeply sloping land to the west and south with, a bank along the northern side and the excavated remains of the tower to the east. The remains of an 18th century gazebo lie on the edge of the terrace at the south western edge of the survey area. See Plates 1 – 3 below.

1.4.3 The ground conditions across the site were generally considered to be favourable for the collection of GPR data. Weather conditions during the survey were mainly fine with some light showers. The survey was carried out after a generally dry period and ground moisture at depth was expected to be relatively low.

Plate 1: Survey area looking north west

Plate 2: Eastern edge of terrace and western side of tower remains - looking south

Plate 3: Southern edge of terrace looking east towards the southern end of the tower

1.5 Site history and archaeological potential

1.5.1 The information set out below is taken from Palmer, 2020.

1.5.2 The extant building remains of Baginton Castle consist of the basement of a tower house built by Sir William Bagot in the late 14th century, and probably set within an earlier earthwork castle enclosure, on the edge of a plateau overlooking the River Sowe. To the south and east, and probably also the north, the castle enclosure was surrounded by a deep ditch, although only the south arm has survived later landscaping. To the south of the tower is a possible barbican area belonging to the earlier castle. The tower basement and the southern arm of the ditch were excavated in the 1930s (Edwards 1951; Chatwin 1947) and the surviving masonry remains were conserved in 2011 (Palmer 2012). To the east of the castle and running eastwards towards St John's Church over a higher plateau is an area of earthworks which seem mainly to represent shrunken medieval settlement belonging to the village of Baginton (Moore et al 1993). Gravel quarrying to the north revealed prehistoric, Romano-British and early Anglo-Saxon settlement, beneath later medieval remains (Edwards 1951; Wilkins 1975). The castle fell out of use by the early 16th century and was probably ruinous by 1545. In the early 18th century the area was landscaped as part of a park around Baginton Hall. The castle enclosure was levelled upwards and a gazebo was built on its western edge. The area is subsequently described as the 'Bowling Green' and it originally extended over the tower basement until excavations began in the late 19th century. The level of the late medieval ground surface and depth of the 18th century landscaping can be gauged along the southern part of the west wall of the extant tower at between 2.4m and 2.9m below the modern level and then rising to 0.6m at its north west corner where bedrock was observed in 2011.

1.5.3 During 2017 a geophysical survey comprising both magnetometry and resistivity was carried out by Abingdon Archaeological Geophysics across the survey area and a wider zone around the castle remains (Ainslie 2017). Most of the features located appear to relate to post-medieval activity. The most prominent feature found by both magnetometry and resistivity was the ironwork of the light railway used to remove spoil from the 1930s excavation. This ran from north of the tower basement south-eastwards towards the site of a wooden bridge to a spoil heap across the ditch. Part of a turntable is still visible in the surface. It seems possible that some high resistance patches across the centre of the area may represent denser layers of gravel in the 18th century landscaping make-up evident in the 2011 recording (Palmer 2012, 17) and which may have been a foundation for the bowling green. The survey produced no convincing evidence for a medieval curtain wall, inner ward buildings or the northern arm of the castle ditch. However, if they exist these would be obscured by the 18th century landscaping. Even the strip surveyed at greater depths across the presumed line of the northern ditch (Ainslie 2017, Fig 8) will have struggled to get below the landscaping. The absence of any visible remains of buildings in the survey may perhaps be taken to suggest that there are no walls within the landscaping make-up upstanding to the

same level as those of the tower. However, it is possible that any buildings here were more thoroughly demolished or possibly of timber construction.

1.6 Geology and soils

1.6.1 The underlying geology is Helsby Sandstone Formation (formerly Bromsgrove Sandstone) formed during the Triassic period. The sandstone is overlain by superficial deposits belonging to the Baginton Sand and Gravel Formation formed during the Quaternary (British Geological Survey, 2017). The site is known to have been terraced with the adjacent tower foundation built on the sandstone so the presence of any superficial deposits is unclear but considered possible particularly in the southern part of the survey area. In addition, the area is known to have been landscaped with mixed material, probably mainly from the Baginton Sand and Gravel Formation, and as a consequence the precise ground make-up is unclear.

1.6.2 The overlying soil in the vicinity of the site is from the Wick 1 association and is a typical brown earth. It consists of a well drained, coarse, loamy and sandy soil over gravel (Soil Survey of England and Wales, 1983). Due to past land use and landscaping the original soil characteristics may have altered significantly.

1.6.3 Sandy and gravelly well drained soil can provide good conditions for GPR survey particularly where clay and moisture levels are low. Naturally formed layers and features within both the solid and superficial geologies may form GPR anomalies; however, the conditions are generally considered to be suitable for GPR survey.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Ground penetrating radar systems transmit an electromagnetic wave into the ground and record the time delay and amplitude of reflections from buried features. Reflections occur from changes in conductivity or dielectric permittivity.

2.1.2 Electromagnetic waves are increasingly attenuated as frequency increases and, therefore, lower frequencies provide greater penetration into the subsurface. However, the longer wavelengths associated with lower frequencies reduce the resolution of buried features. Typical frequencies chosen for archaeological prospection are around 500 and 200 MHz.

2.2 Equipment configuration and data collection

2.2.1 Following an initial trial with 250MHz and 400MHz antennae to discover the most appropriate frequency, ground penetrating radar data were acquired

using an Utsi Electronics Groundvue 3A system running with a 400MHz shielded antenna. The system utilises a wheeled encoder system on a small cart. A dielectric constant of 10 was used in the field to set up the instrument and view data. The value is for display purposes only and does not affect the recorded data.

2.2.2 A value of 80ns (nanoseconds) was chosen for the time sweep (two way GPR signal travel time) in order to balance potential depth of penetration and resolution.

2.2.3 Data were collected from scans recorded at 0.0295m along parallel traverses separated by 0.25m. The data captured along each traverse were logged to an internal disk drive to allow further processing and analysis.

2.3 Survey referencing and base mapping

2.3.1 Ground penetrating radar data were collected along traverses originating from a common baseline, see Fig 02. The start position for each traverse along the baseline from the start point or origin was measured using a hand tape. A parallel tape was used as a guide to ensure that traverses were surveyed perpendicular to the baseline and parallel to adjacent traverses.

2.3.2 The survey baseline was set out to the OSGB36 datum using a Leica GS10 RTK GNSS. The GNSS is used in conjunction with Leica's Smartnet service, where positional corrections are sent via a mobile telephone link. Positional accuracy of around 10 – 20mm is possible using the system. The instrument is regularly checked against the ETRS89 reference framework using Ordnance Survey ground marker C1ST7784 (Horton).

2.4 Data processing and presentation

2.4.1 Ground penetrating radar data were analysed using REFLEX v8 software. Each traverse was analysed as an individual profile to allow a manual assessment of anomalies. In addition, profiles across each survey area were combined and processed in order to create time slices showing the variation in reflector amplitude at various depths. The following processing has been carried out on GPR data captured during this survey:

- background removal - improves the appearance of the data by removal of strong horizontal bands,
- gain - increased with time in order to amplify weaker reflections from deeper features,
- bandpass filtering - lowers noise by the removal of energy below 200MHz and above 800MHz.

2.4.2 Time slices were analysed using both absolute and envelope reflectivity strengths. The latter use a square root function of the energy at an instant in time and is generally the preferred option; however, occasionally the absolute

values provide more detailed anomalies.

2.4.3 An abstraction and interpretation is offered for all geophysical anomalies located by the survey (Fig 04). A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective assessment of features within each survey area. Approximate depth to anomalies is added to the abstraction and interpretation plot.

2.4.4 The main form of data display prepared for this report is the greyscale plot derived from Reflex as TIF files. Four example time slice amplitude plots using absolute data values are shown in Fig 03; note that the greyscale renders very high and low amplitudes in light grey shades with darker shades for mid-range amplitudes to improve clarity of anomalies. A series of time slice amplitude plots representing an increasing depth of approximately 0.05m are plotted in Figs 06 – 10 using envelope reflectivity amplitudes (see 2.4.2), and these are shown using a greyscale range rendering low magnitude reflections as dark shades and high magnitude as light grey shades.

2.4.5 A selection of GPR profiles (radargrams) are shown in Figs 11 – 14. The profiles are shown using a colour scale and can be referenced to traverses highlighted in Fig 02.

2.4.6 GPR anomalies are abstracted within Figs 04 & 05 using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.

2.4.7 The raster images are combined with base mapping using ProgeCAD Professional 2020 creating DWG file formats. A digital archive, including raster images, is produced with this report, see Appendix A below.

3 RESULTS

3.1 General assessment of survey results

3.1.1 The GPR survey located a number of anomalies within the survey area. Three general classifications were chosen that group anomalies with archaeological potential, anomalies of uncertain origin and anomalies with a modern origin. Anomalies considered likely to relate to naturally formed layers and features are not numbered but are considered within Section 4 further below.

3.1.2 Abstracted anomalies are derived from analysis of time slices and profiles. Example profiles are included in Section 4 where they are considered to be useful, Figs 11 – 14 also contain a series of example profiles. Example time slices are shown in Figs 06 – 10.

3.1.3 An average GPR wave velocity of 0.08m/ns was calculated using hyperbola matching. There were very few clear hyperbola that could be used for the

analysis, but the velocity would be consistent with the sandy and gravelly soil and superficial geology.

3.2 Statement of data quality and other factors influencing the interpretation of anomalies

3.2.1 The GPR data were collected with due consideration given to surface conditions, obstructions and area constraints. GPR signals appear to have achieved good penetration and maximum depth is likely to be approximately 3m. The flat and level survey area with short grass cover provided very good conditions for ground coupling with the radar antenna.

3.2.2 The abstraction and interpretation process was complicated by the presence of a number of sloping structures and layers considered likely to be of natural origin. These are further complicated by episodes of landscaping that probably involved both the removal of material, particularly in the northern part of the survey area, followed by ground make-up and levelling, with some spoil deposition along the southern edge of the area.

3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A general explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, see Table 1.

Interpretation category	Description and origin of anomalies
Anomalies with archaeological potential	Anomalies have the characteristics of a range of archaeological features such as walls, structures, etc..
Anomalies with an uncertain origin	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered.
Anomalies with a modern origin	Reflections clearly related to modern features.

Table 1: List and description of GPR interpretation categories

3.4 List of ground penetrating radar anomalies

Area centred on OS NGR 434095 274745, see Fig 04.

Anomalies of archaeological potential

(1) – Linear anomalies at approximately 0.5m – 0.6m below the surface may relate to former 18th century features as they have a similar orientation to the gazebo. The reflections are generally weak and poorly defined, possibly indicating former garden features and/or poorly surviving structural remains. It is possible that the anomalies relate to a former bowling green thought to exist within the survey area.

(2) – Weak and poorly defined linear anomalies that may also relate to former 18th century features given their general orientation and depth.

(3) – Weak linear anomalies forming a narrow rectilinear feature. Its orientation is similar to the north wall of the tower remains to the east, although the reflections are not consistent with surviving structural remains.

(4) – A broad zone of variable reflections reflecting the angle of northern and eastern sides of the gazebo and separated from it by approximately 7.5m. The reflections may indicate a layer, approximately 0.25m thick, of made ground, path or garden feature likely to be associated with the 18th century activity.

(5) – A zone of variable reflections confined between anomalies (1) and indicative of an infilled depression up to a depth of approximately 1m. It may relate to a former garden/landscape feature from the 18th century. Hachures denote the approximate location and extent of sloping layers/features between depths of approximately 0.5m to 1m.

(6) – Several very weak and fragmented linear anomalies within the eastern part of the survey area were located at depths of approximately 1.2m – 1.5m. The orientation of these anomalies is similar to the adjacent medieval tower base and different to shallower features considered to be 18th century. It is possible, therefore, that the anomalies represent former medieval structures, although interpretation is tentative as they only appear as weak trends within stronger responses relating to sloping subsurface layers.

(7) – Variable reflections possibly indicative of a layer relating to anomalies (6) and potentially of medieval origin.

(8) – A broad curving zone of complex reflections, with some linear elements, at a depth of 1.1m – 1.9m. The feature appears to overlie sloping layers likely to be of natural origin, and the response could be consistent with structural remains or debris possibly as an in-situ wall or relating to demolition material. It appears to be around 25m long with a width of 3m – 4m. The feature appears most strongly defined in the southern part of the survey area but becomes weak and diminishes in the centre.

Anomalies of uncertain origin

(9) – Overlying the break of slope associated with a buried horizon there appears to be slightly raised features with a similar orientation. The dimensions and nature of the anomalies caused by the features could be consistent with fragmented structural remains; however, given their close relationship to the sloping layer

below, it cannot be confidently determined whether they are archaeologically significant, or relate to a natural feature, or are part of ground make-up.

Anomalies with a modern origin

(10) – Very weak reflections at approximately 0.3m appear to indicate a small rectilinear feature of uncertain origin. The depth would tend to indicate that it is of relatively recent origin.

(11) – Strong reflections from a shallow depth indicate a small light railway used to remove spoil from excavation in the 1930s. There are also reflections from some sleepers and a turntable.

(12) – Variable and dipping reflections probably indicative of spoil dumping from the 1930s excavations or more recent ground consolidation.

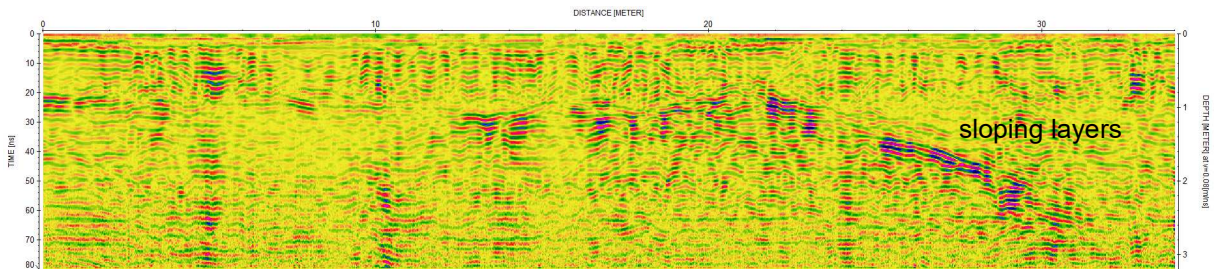
(13) – Near surface reflections associated with made ground and/or ground compression immediately adjacent to the gazebo.

(14) – Numerous small zones relating to relatively modern surface or near surface ground disturbance, infill, consolidation and dumping.

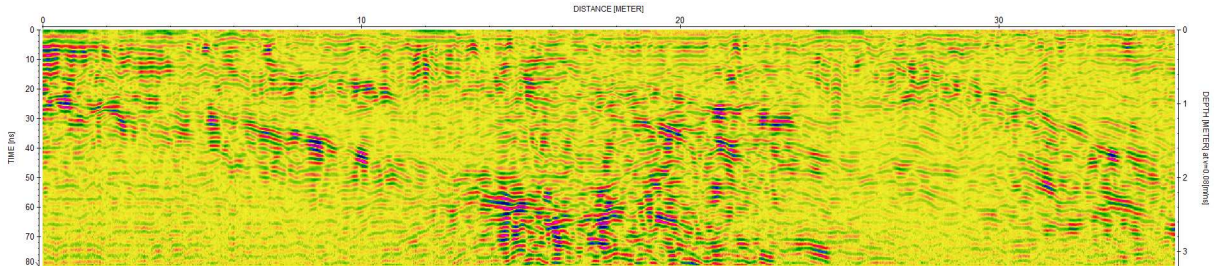
4 DISCUSSION

4.1 Subsurface make-up

4.1.1 The results of the GPR survey indicate the presence of numerous subsurface horizons that include both near horizontal and sloping layers, see Radargrams 1 and 2. The broad trends are reasonably clear from radar profiles across the site, but interpretation is not straightforward as it is likely that there has been episodic landscaping and dumping, as well as possible truncation in some areas, all occurring over superficial and solid geology that can contain complex layers and structures.



Radargram 1: GPR profile for traverse BC006 at the eastern side of the survey area



Radargram 2: GPR profile for traverse BC080 showing sloping layers through the central part of the survey area

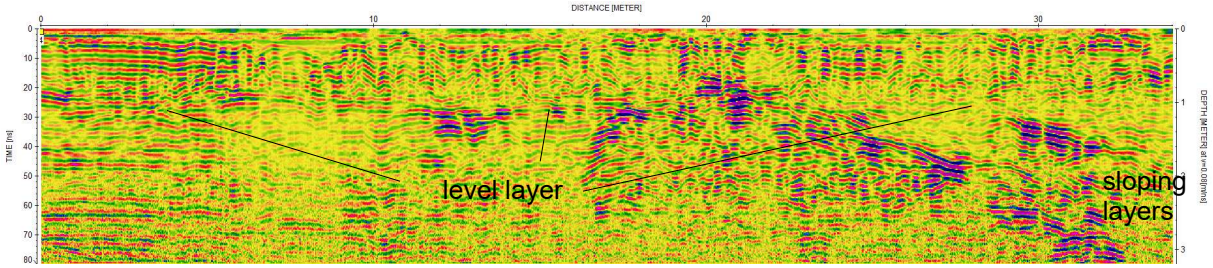
4.1.2 Figure 10 indicates the orientation of the start of the slope for two separate subsurface layers as two separate lines. Layers appear horizontal to the north east of the lines and slope down towards the south west immediately to the south western side of the line. Some profiles indicate the presence of additional sloping layers further to the south west but these do not appear as clear and extensive as the two indicated in the figure. The subsurface depth of the start of slope is consistent along both lines at approximately 1m. The more north eastern line is associated with a sloping layer that can be traced to a depth of approximately 3m.

4.1.3 Analysis of time slices and radar profiles indicates some complexity to these layers that could be consistent with geological features. It is known that both the superficial Baginton Sand and Gravel Formation and underlying Helsby Sandstone Formation can contain complex layering and cross-bedding due to the nature of their deposition. A structure below the layers appears as a broad hyperbola probably indicative of a bar-like structure within the sandstone originally formed by aeolian or fluvial action in the Triassic. This probable naturally formed feature shallows towards the north west of the survey area.

4.1.4 Further evidence for the geological nature of the layers can be seen by both the position and angle the start of slope lines make with the northern terrace bank. It would appear likely that these subsurface structures would continue north west under the terraced natural bank, which represents the Baginton Sand and Gravel Formation, and reflect the orientation of the River Sowe valley side.

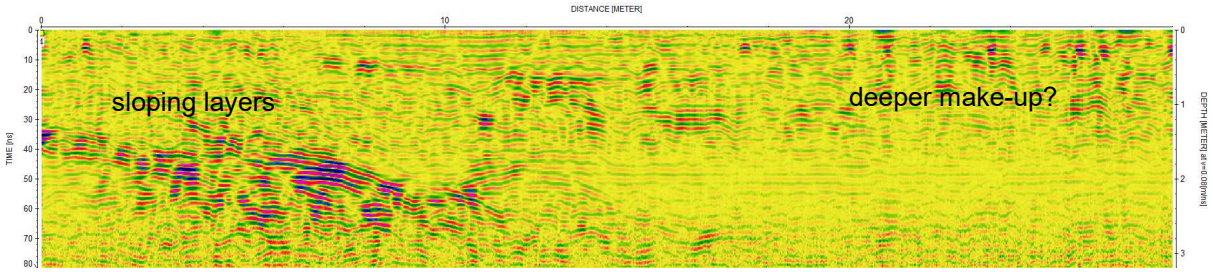
4.1.5 The similar depth of the start of slope lines would indicate the construction of a level surface cutting through the layers at approximately 1m – 1.2m below the current ground surface within the eastern part of the survey area. Abstraction of potential 18th century archaeological features indicates that most occur at depths of less than 1m with only some very weak evidence of possible deeper features up to 1.5m considered more likely to be medieval. This could, therefore, be used as evidence that a level terrace was constructed within the medieval period and that adjacent to the south western part of the surviving tower the height difference was around 1.7m – 1.9m; this would indicate that the tower was constructed within a much deeper excavation. No clear edge to this excavated area was visible in the data

suggesting the original cut lies close to that which is currently exposed, see Plate 2 (1.4.3).



Radargram 3: GPR profile for traverse BC008 showing level surface at approximately 1m - 1.2m depth

4.1.6 Clear evidence for coherent sloping subsurface layers is lacking from the south western part of the survey area from just to the east of the gazebo around to the western edge. It is considered possible that this part of the site has been subject to deeper ground-make up, as the somewhat irregular appearance of layers down to approximately 2m below the surface could be consistent with dumping or landscaping representing a westward extension to the terrace. The north western part of the area contains broad hyperbolic reflections relating to the bar-like structure of natural origin (see 4.1.3) that rises closer to the surface in this area, possibly disrupting the sloping structures seen further to the south east.



Radargram 4: GPR profile for traverse BC118 showing a lack sloping layers in the south western part of the site

4.2 Potential archaeological features of medieval origin

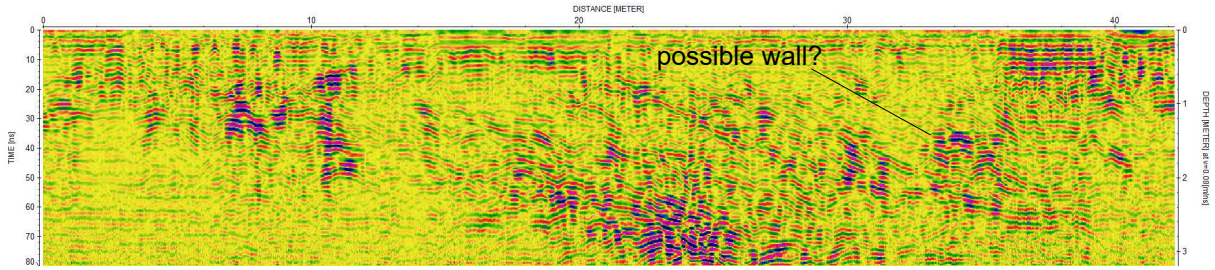
4.2.1 The survey failed to locate clear anomalies associated with the putative northern arm of the castle ditch, although sloping layers **(5)** in roughly the expected location could potentially relate to an infilled depression, potentially the upper part of a substantial ditch. However, the orientation of the features, and their reasonably shallow depth (0.5m – 1m), is considered more likely to indicate former 18th century landscape features or perhaps former excavations. Interpretation is tentative but the GPR profiles do not seem to provide any clear evidence for a deep ditch.

4.2.2 Very weak anomalies possibly relating to buildings/structural remains were

located in the north eastern part of the survey area, and possible wall remains within the southern and central parts of the area. Anomalies are fragmentary and interpretation relies heavily on orientation, depth and the expected site layout.

4.2.3 The possible medieval anomalies appear to occur at depths of 1m – 1.5m directly overlying, or possibly cut into, layers considered likely to be of natural origin (approximately 1m – 1.2m deep). Several very weak linear trends in the eastern part of the survey area have a similar orientation to the tower, anomalies **(6)**. At depths of 1.2m – 1.5m they may represent former wall footings but the very fragmentary nature of the anomalies gives a low level of confidence to interpretation. Fragments of a possible layer or structural debris was also abstracted from a similar depth in the vicinity of the linear anomalies, **(7)**. Interpretation may suggest that the anomalies relate to a former building and floor base but could also indicate other external formal partitioning and surfaces, perhaps relating to gardens or working areas.

4.2.4 Variable reflections form a broad, curving, linear anomaly in the central and southern parts of the survey area, anomaly **(8)**, may indicate a substantial wall, although could relate to dumped material. The width of the anomaly is around 3m – 4m, and it occurs from around 1.1m – 1.9m in depth overlying sloping layers but generally not sloping itself. It is approximately 25m in length. Within the broad response there appears to be some possible narrow linear elements and a sharply defined south western edge. It is possible that the feature represents the remains of the postulated curtain wall, and if so, it may define the medieval extent of the terrace. It may also represent an accumulation of demolition debris, but if this is the case then it may also suggest a terrace significantly smaller than present and could possibly define part of an earlier castle earthwork.



Radargram 5: GPR profile for traverse BC045 indicating a possible deeply buried wall

4.3 Potential archaeological features of 18th century origin

4.3.1 The survey located a number of anomalies considered likely to be associated with 18th century use of the site **(1 - 4)**. Interpretation is based mainly on orientation and depth, generally anomalies occurring at approximately 0.4m – 0.6m in depth. Linear elements are frequently poorly defined and probably do not represent substantial structural remains. It is likely that a number of formal

garden features or paths are represented and some may relate to a former bowling green thought to exist within the survey area.

4.3.2 An elongated depression **(5)** was located to the north east of the gazebo. It appears confined between two linear features and extends to around 1m deep. The sloping sides and narrow base to this feature tend to preclude any association with bowling, and a former landscape or garden feature is considered a more likely origin.

5 CONCLUSION

5.1.1 The results of the GPR survey demonstrate useful reflections recorded down to a depth of approximately 3m. Several sloping and horizontal layers representing the subsurface can be seen in GPR profiles, and it is considered likely that both geological features and layers representing former surfaces are present. A horizon at approximately 1m below the current surface may represent the former medieval surface in the north eastern part of the survey area with sloping layers indicating a depth of over 2m towards the southern limit of the survey.

5.1.2 The survey failed to provide any convincing evidence for the putative northern arm of the castle ditch. A wide depression located in roughly the expected location of the ditch only appears to extend to around 1m in depth and may well indicate a former landscape/garden feature dating to the 18th century, or former intrusive investigations.

5.1.3 A broad, curving, linear anomaly was located in the southern part of the area and could be traced into the central part with a length of around 25m. The response, depth (1.1m – 1.9m) and dimensions could be consistent with a substantial wall, possibly the curtain wall to the castle enclosing a rather smaller area than the current terrace. Several weak and fragmented linear anomalies and small patches of response may indicate a former medieval structure, and associated layer, in the north eastern part of the survey area; however, interpretation is tentative and inferred mainly from depth and orientation of anomalies.

5.1.4 Several linear anomalies and broad features appear to have orientations similar to the gazebo and occur at approximately 0.5m – 0.6m below the surface. It is considered likely that these relate to former garden or landscape features laid out in the 18th century and possibly elements of an 18th century bowling green. Other anomalies of modern origin include a light railway system and turntable used to remove spoil from excavations and shallow patches of made-ground or spoil dumping.

6 REFERENCES

Ainslie, R., 2017. *Bagots Castle, Baginton, Warwickshire.* Abingdon Archaeological Geophysics Report 2017-11v3.

British Geological Survey, 2017. *Geology of Britain 3D (Beta version), 1:50 000 scale [online]* available from http://mapapps.bgs.ac.uk/geologyofbritain3d/index.html? [accessed 20/10/2020].

Chartered Institute for Archaeologists, 2014. *Standard and Guidance for archaeological geophysical survey*. IfA, University of Reading.

Chatwin, P. B., 1947. *Castles in Warwickshire.* Trans Birmingham Warwickshire Archaeol Soc 67 (1947-48), 1-34.

Edwards, J. H., 1951. *Baginton Castle excavations, 1933-48.* Trans Birmingham Warwickshire Archaeol Soc 69 (1951), 44-49.

European Archaeological Council, 2015. *EAC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider.* Europae Archaeologia Consilium and Association Internationale sans But Lucratif, Belgium.

Historic England, 2018. Geophysical Survey Advice [online] available from https://historicengland.org.uk/advice/technical-advice/archaeological-science/geophysics/ [accessed July 2018].

Institute for Archaeologists, 2002. *The use of Geophysical Techniques in Archaeological Evaluations*. IfA Paper No. 6. IfA, University of Reading.

Palmer, N., 2012. *Bagot's Castle, Baginton – Archaeological recording of consolidation work*. Hunningham.

Palmer, N., 2020. *Bagot's Castle, Baginton, Warwickshire, Proposed ground penetrating radar survey (v2.0)*. Unpublished typescript document.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 3 Midland and Western England.*

Wilkins, G. G., 1975. *A section of a gravel pit at Baginton, Coventry.* Trans Birmingham Warwickshire Archaeol Soc 87 (1975), 111-27.

Appendix A – digital data archive

Archaeological Surveys Ltd hold the primary digital archive at offices in Wiltshire (see inside cover for address). Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site.

Surveys are reported on in hardcopy using A4 for text and A3 for plots (all plots are scaled for A3). The distribution of both hardcopy report and digital data is considered the responsibility of the Client unless explicitly stated in the survey Brief, Written Scheme of Investigation or other contractual agreement.

This report has been prepared using the following software on a Windows 10 platform:

- Reflex v8 (GPR data analysis)
- ProgeCAD Professional 2020 (report plots),
- LibreOffice.org 6.4.4.2 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

Appendix B – Historic England Geophysical Survey Database Questionnaire

Survey Details

Name of Site: Baginton Castle
County: Warwickshire

NGR Grid Reference (Centre of survey to nearest 100m): **SP 34095 74745**

Start Date: 18/08/2020 **End Date:** 18/08/2020

Geology at site: Helsby Sandstone Formation (formerly Bromsgrove Sandstone) Baginton Sand and Gravel Formation

Known archaeological Sites/Monuments covered by the survey
(Scheduled Monument No. or National Archaeological Record No. if known)

Baginton Castle, associated settlement remains, ponds and mill sites. SM No. 1011193

Archaeological Sites/Monument types detected by survey

Possible medieval wall, possible medieval surface, 18th century landscaping and possible bowling green.

Surveyor (Organisation, if applicable, otherwise individual responsible for the survey):David Sabin, Archaeological Surveys Ltd

Name of Client, if any: Warwickshire Wildlife Trust and Bagot's Castle

Purpose of Survey: To locate the putative northern arm of the castle ditch, trace any surviving curtain wall and locate any medieval buildings.

Location of:

a) Primary archive, i.e. raw data, electronic archive etc:
Archaeological Surveys Ltd, 1 West Nolands, Nolands Road, Yatesbury, Calne, SN11 8YD

b) Full Report: As above with copy to OASIS and HER

Technical Details

(Please fill out a separate sheet for each survey technique used)

Type of Survey (Use term from attached list or specify other):
Ground Penetrating Radar

Area Surveyed, if applicable (In hectares to one decimal place): 1322m²

Traverse Separation, if regular:	**Reading/Sample Interval:**
0.25m	0.0295m

Type, Make and model of Instrumentation:

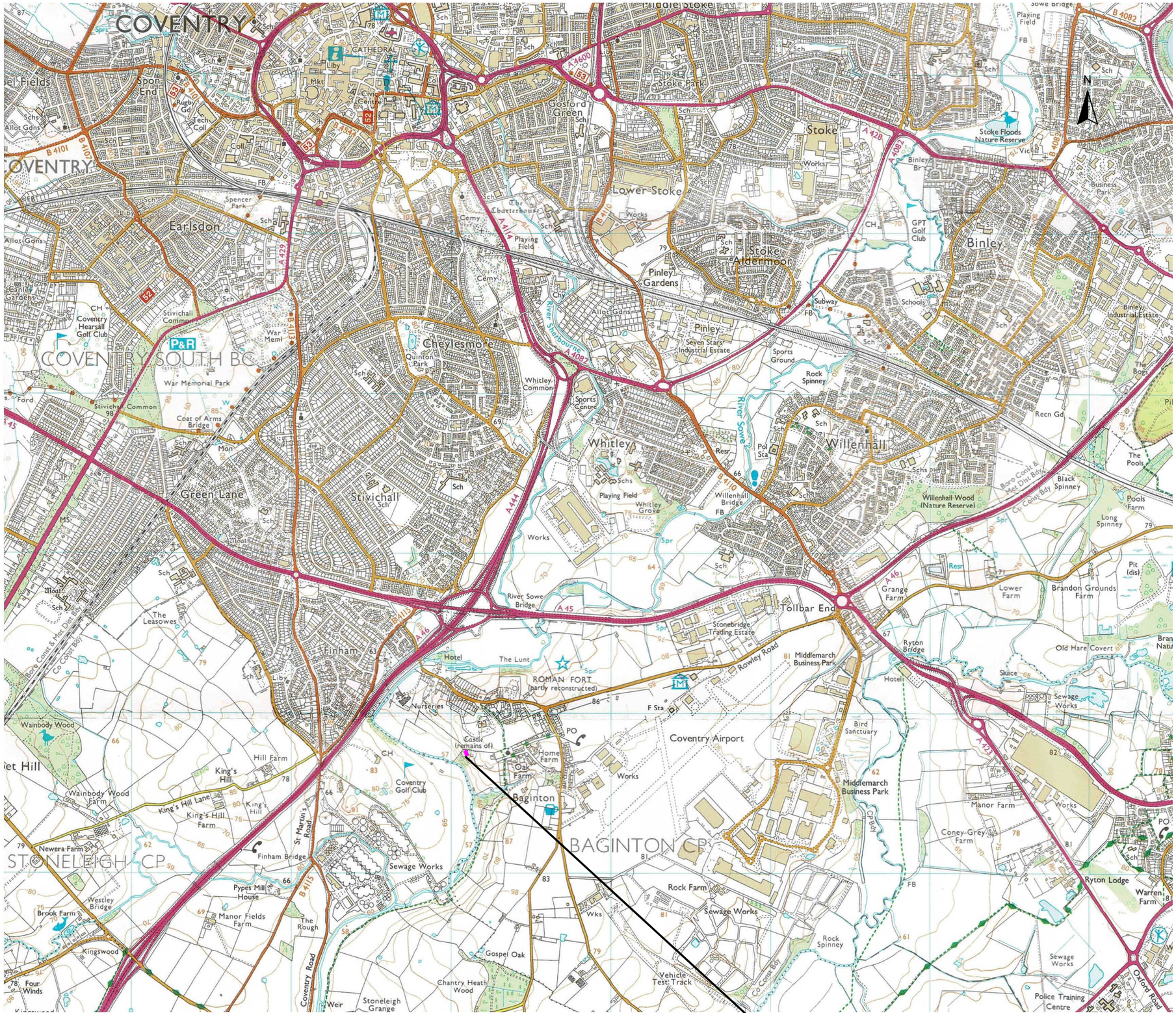
Utsi Electronics Groundvue 3, 400Mz shielded antenna

Land use at the time of the survey (Use term/terms from the attached list or specify other):
Lawn

Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Map of survey area



● Survey location

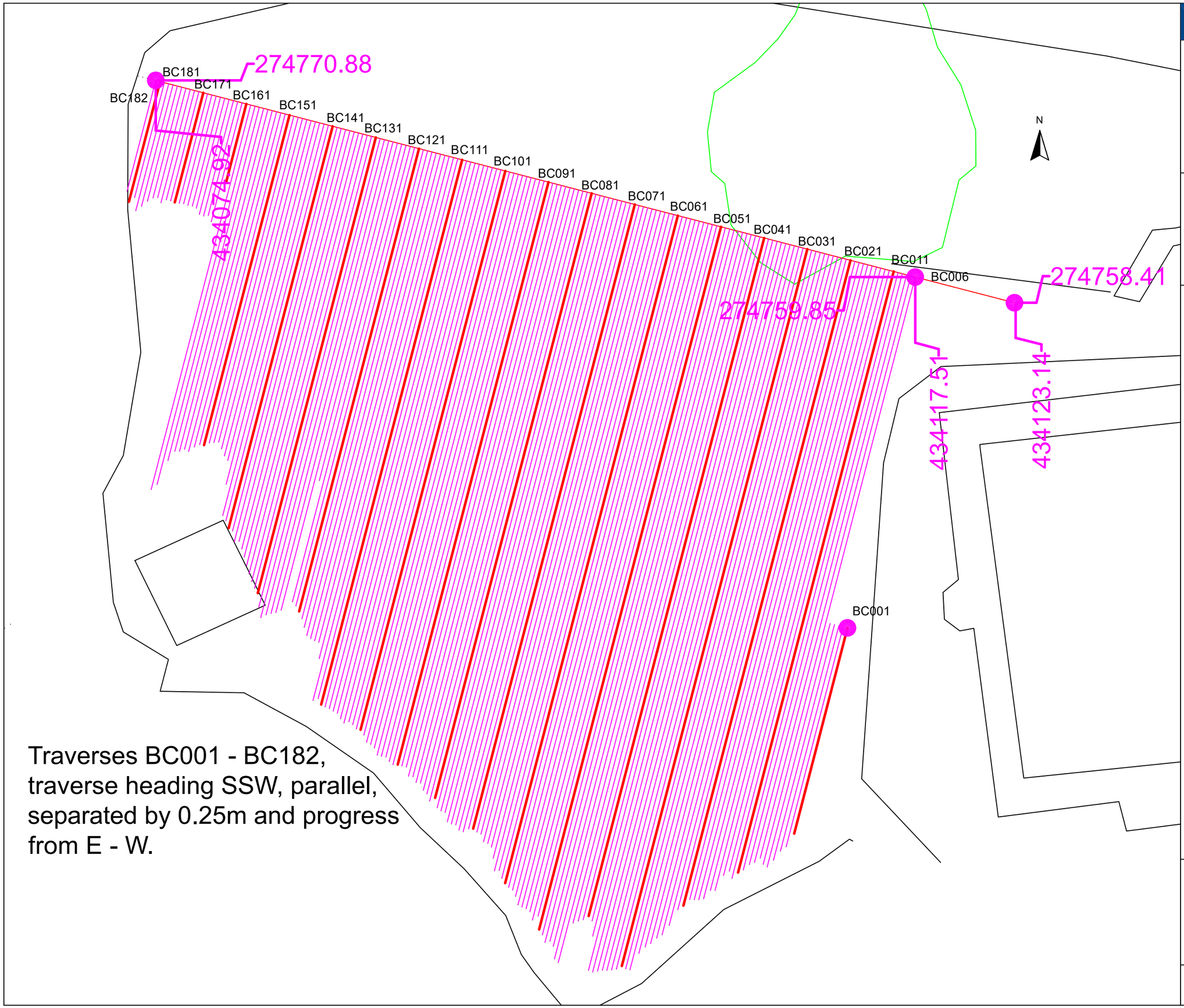
Site centred on OS NGR SP 34095 74745

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
DJS	KTD	FIG 01



Traverses BC001 - BC182, traverse heading SSW, parallel, separated by 0.25m and progress from E - W.

Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar survey referencing information

Baseline coordinates referenced to OSGB36 datum using RTK GNSS.

Traverse separation - 0.25m with parallel data collection.

Antenna frequency 400MHz.

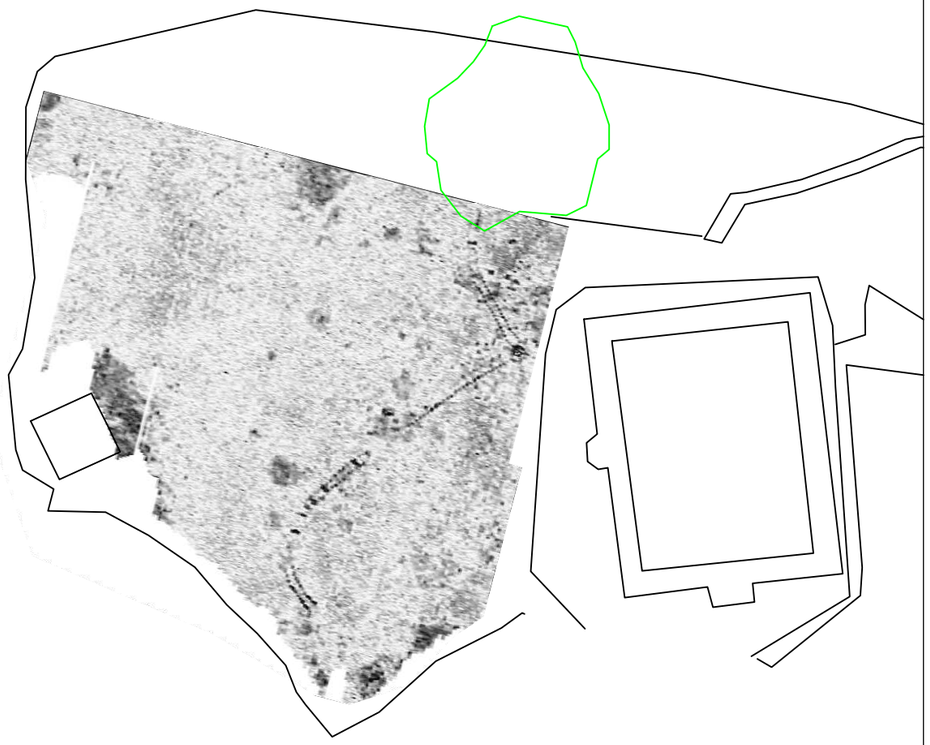
BC001 etc. - traverses plotted as GPR profiles (Figs 11-14)

SCALE 1:200

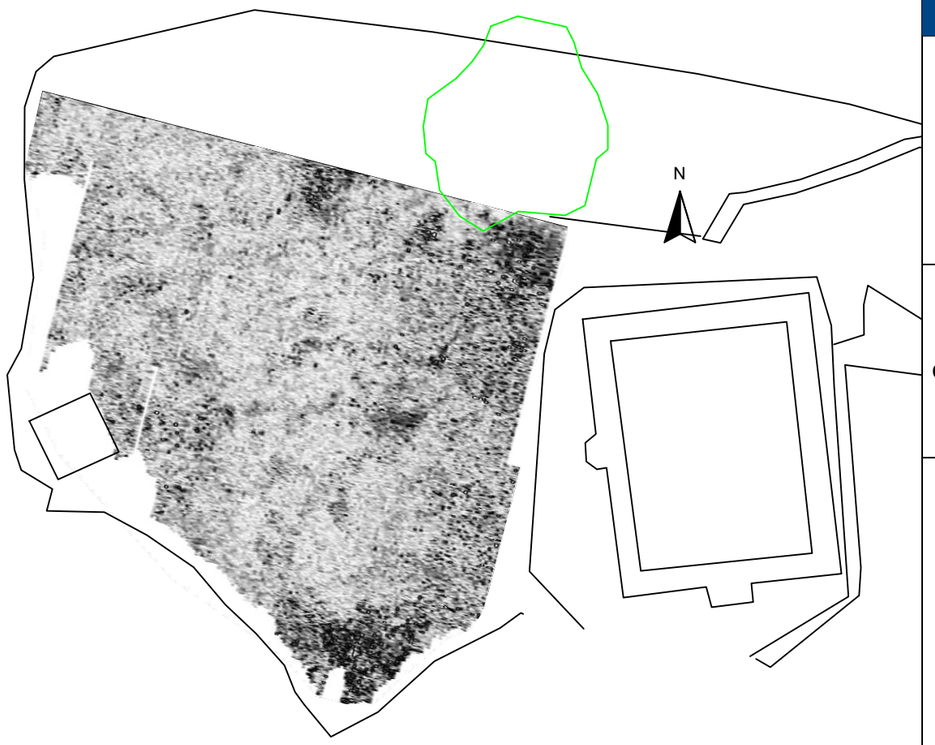
0m 2 4 6 8 10m

SCALE TRUE AT A3

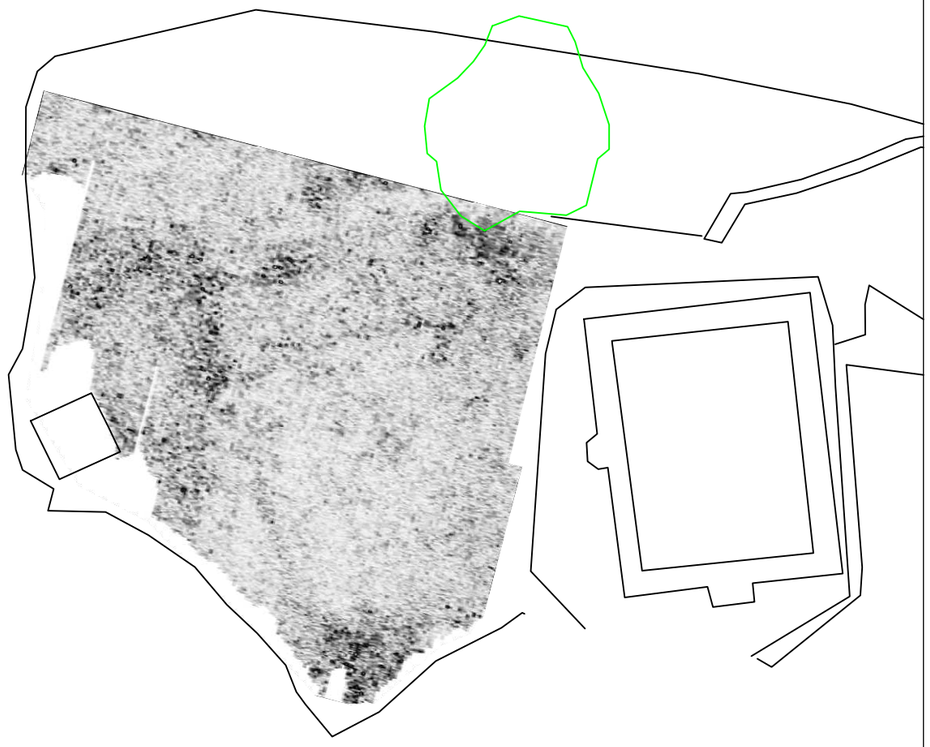
DRAWN BY	CHECKED BY	
DJS	KTD	FIG 02



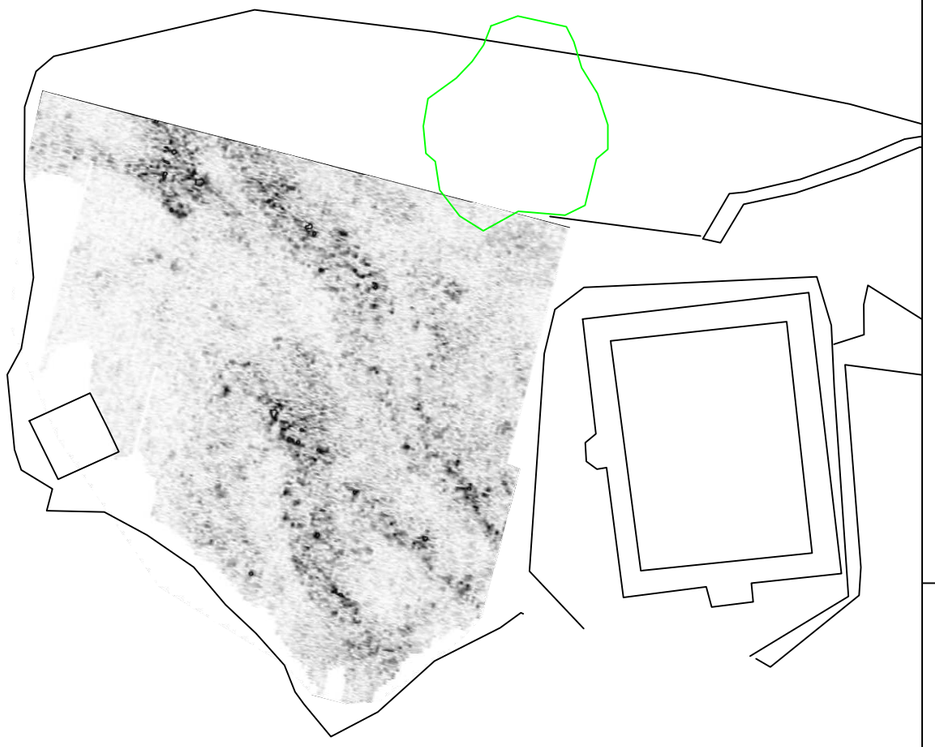
GPR time slice at 1.25ns (approximately 0.05m)



GPR time slice at 11.25ns (approximately 0.45m)



GPR time slice at 15.6ns (approximately 0.6m)



GPR time slice at 37.5ns (approximately 1.5m)

Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar example time slices plotted using absolute values

high amplitude reflection

low amplitude reflection

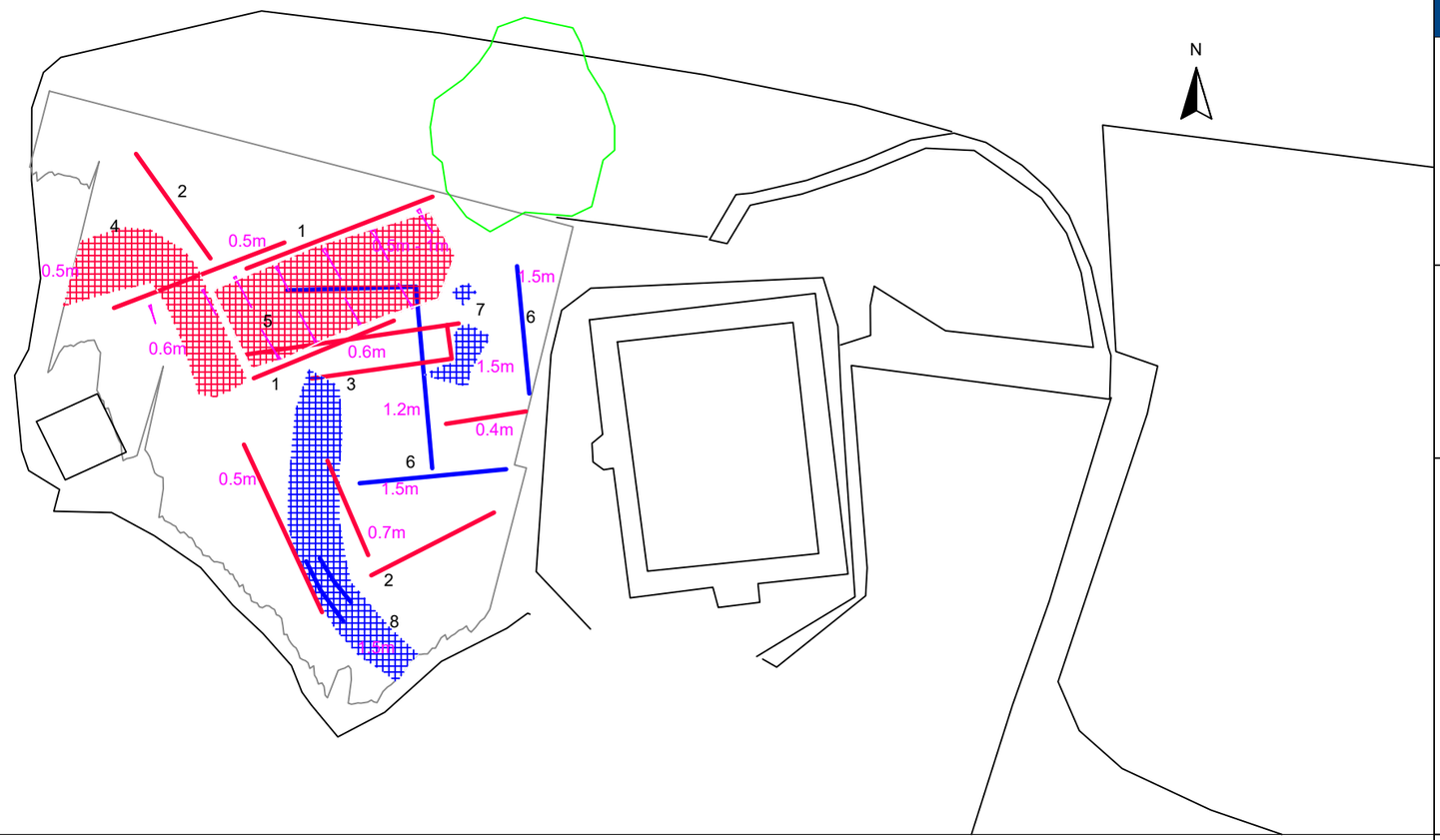
SCALE 1:500

0m 5 10 15 20 25m

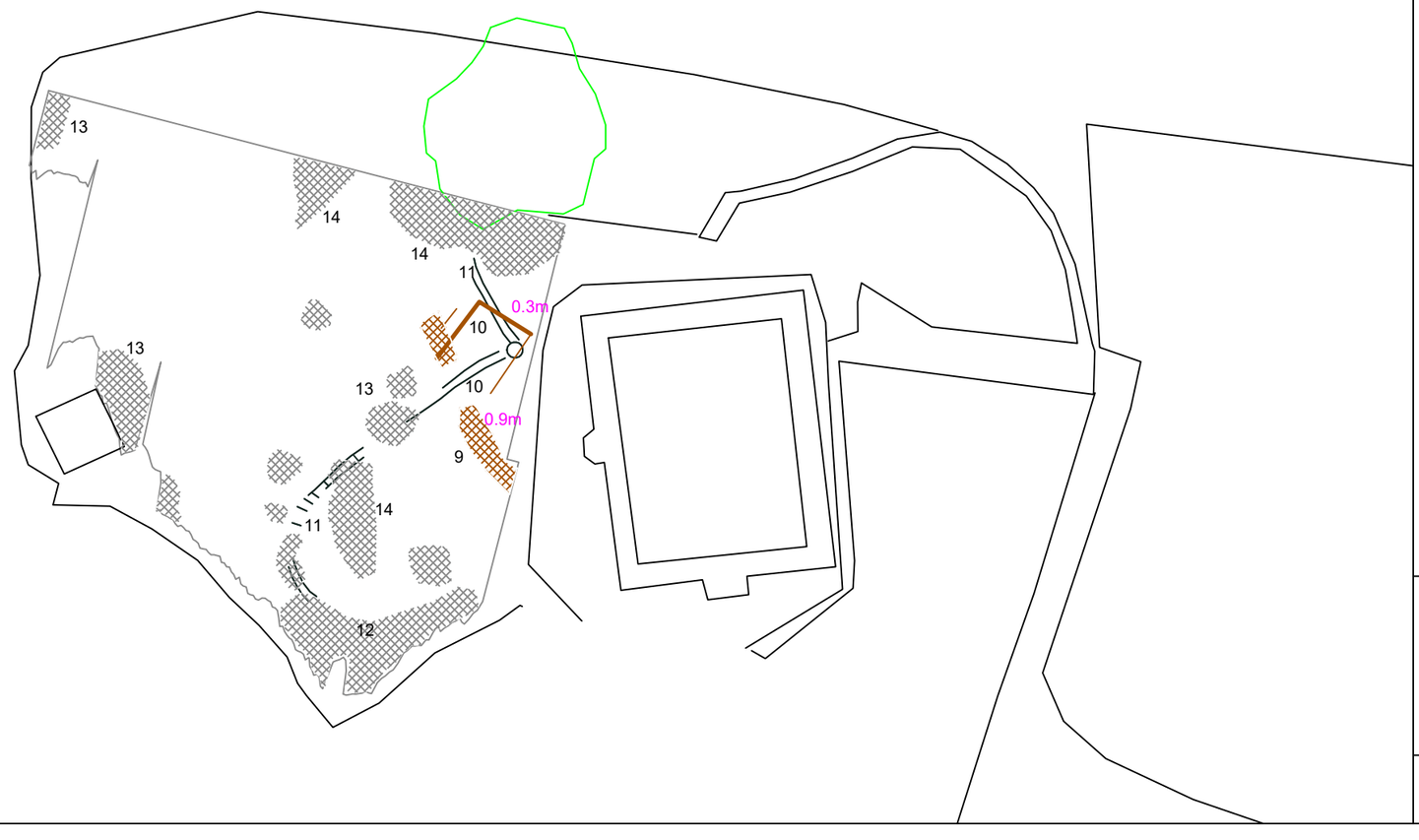
SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
DJS	KTD	FIG 03

Abstraction and interpretation of ground penetrating radar anomalies with archaeological potential



Abstraction and interpretation of ground penetrating radar anomalies with an uncertain or modern origin



Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Abstraction and interpretation of ground penetrating radar anomalies with archaeological potential and of uncertain or modern origin

- Linear feature of archaeological potential - possible former post medieval garden/landscape/bowling green feature
- Area of complex reflections - possible post medieval garden feature/structural debris
- Linear feature of archaeological potential - possible medieval features
- Area of complex reflections - possible medieval layer/structural debris
- Hachure indicating sloping subsurface feature/layer
- Shallow linear feature of uncertain origin - possible modern feature
- Rails, sleepers and part of turntable associated with 1930s excavations
- Feature of uncertain origin - possible structural/natural/made ground

1 Anomaly reference label

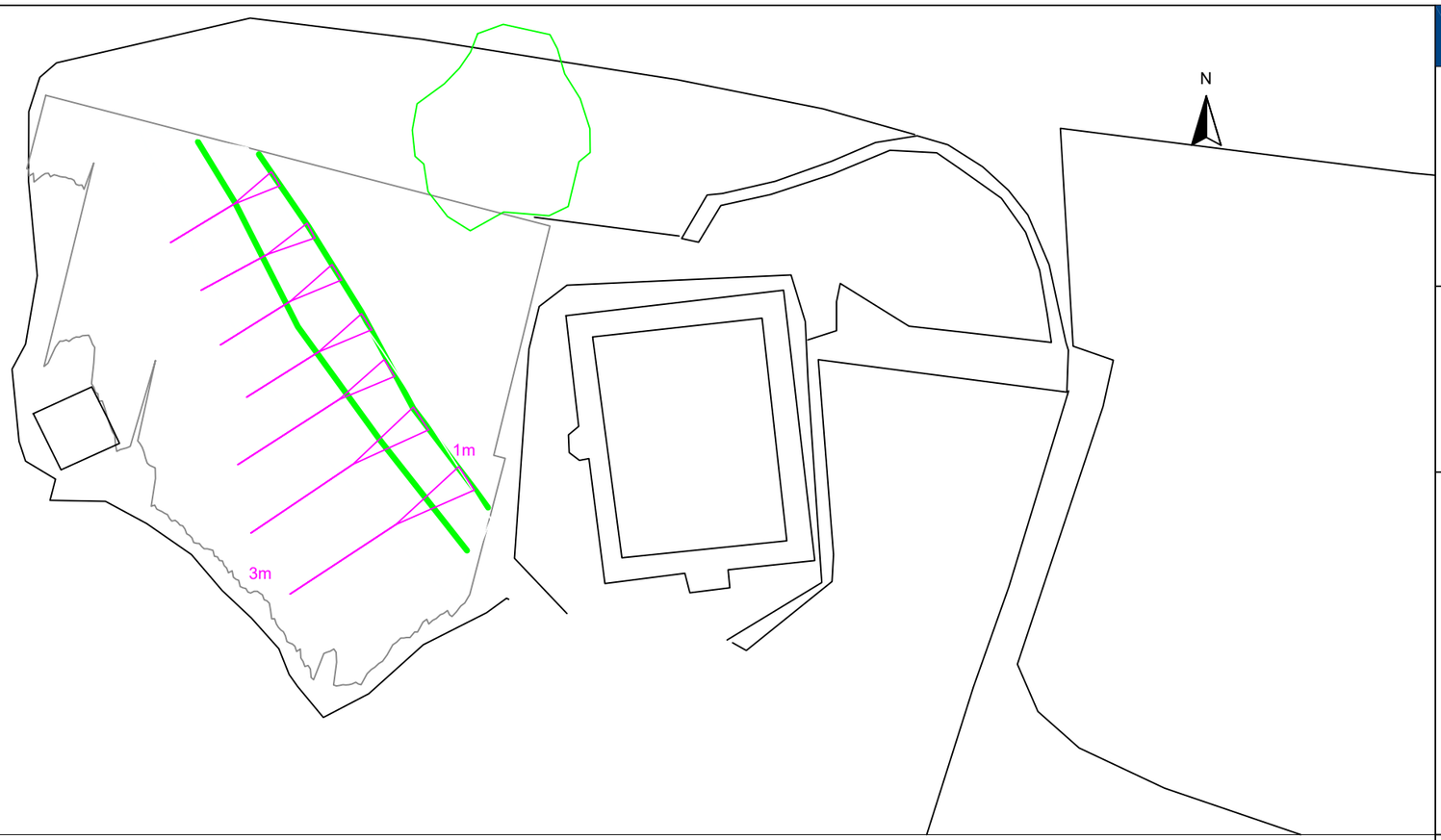
0.5m Approximate depth

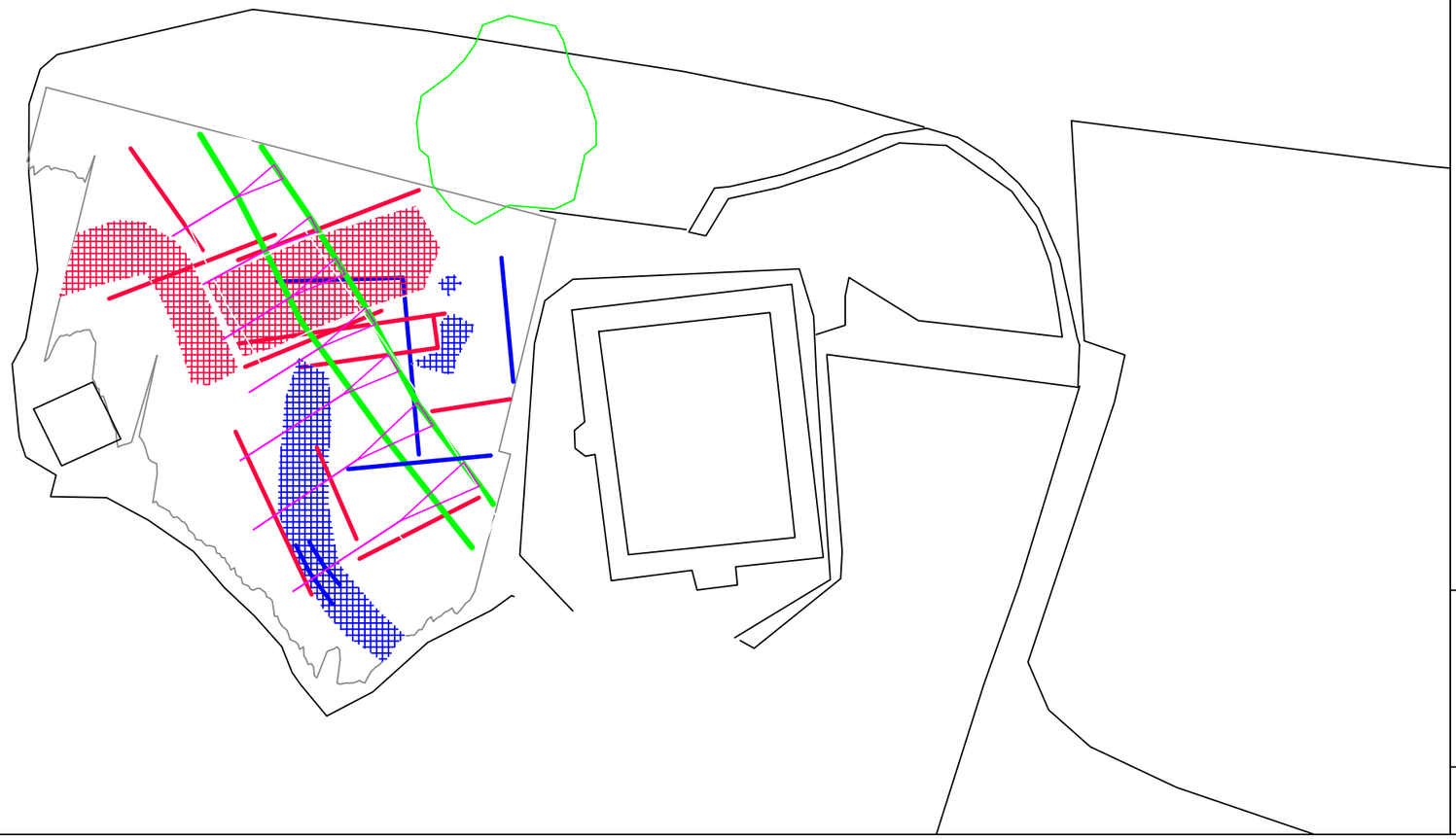
SCALE 1:500

0m 5 10 15 20 25m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
DJS	KTD	FIG 04





Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Abstraction of the orientation of the start of slope of two subsurface sloping layers shown with and without features of archaeological potential

Start of slope for two of the main sloping layers

Hachure indicating slope of most extensive layer

0.5m Approximate depth of sloping layer

Linear feature of archaeological potential - possible former post medieval garden/landscape/bowling green feature

Area of complex reflections - possible post medieval garden feature/structural debris

Linear feature of archaeological potential - possible medieval features

Area of complex reflections - possible medieval layer/structural debris

Start of slope for two of the main sloping layers

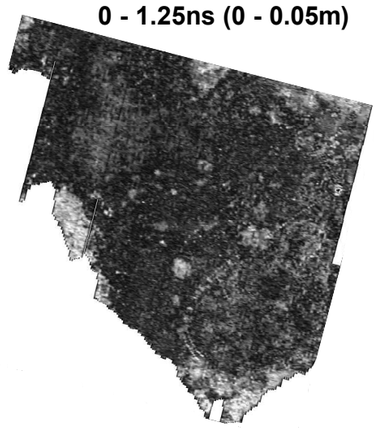
Hachure indicating slope of most extensive layer

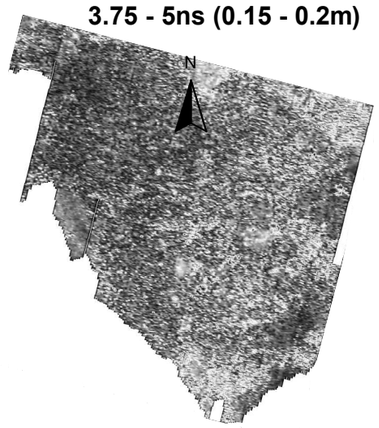
SCALE 1:500

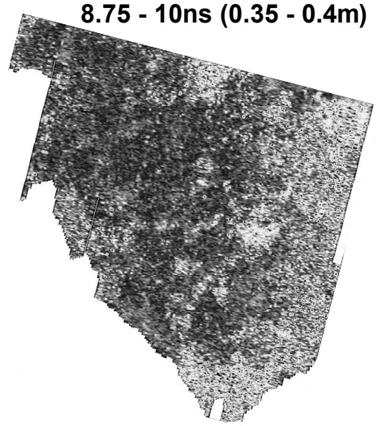
0m 5 10 15 20 25m

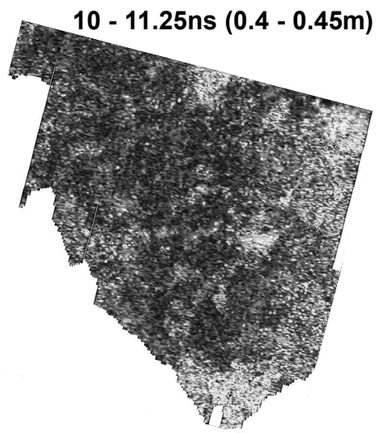
SCALE TRUE AT A3

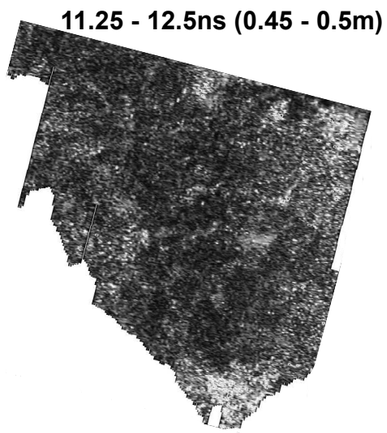
DRAWN BY	CHECKED BY	
DJS	KTD	FIG 05

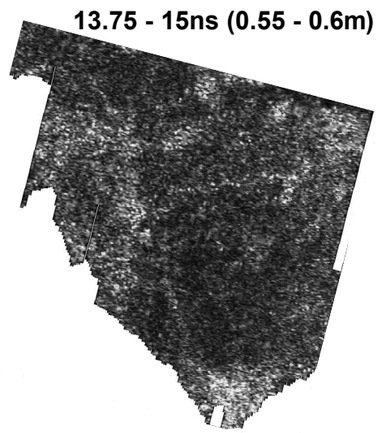












Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar time slices plotted using envelope amplitude

high amplitude reflection

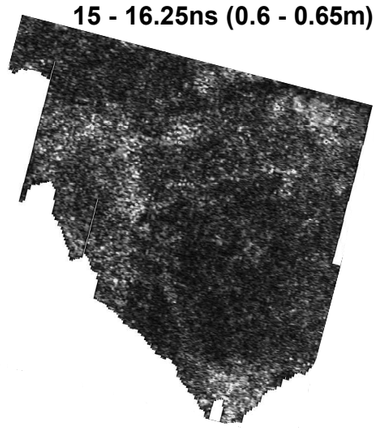
low amplitude reflection

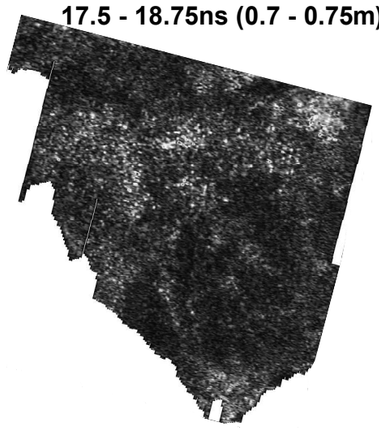
SCALE 1:750

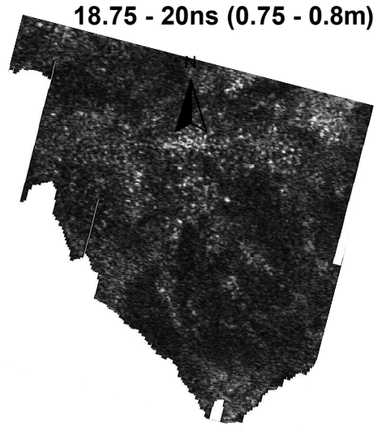
0m 5 10 15 20 25m

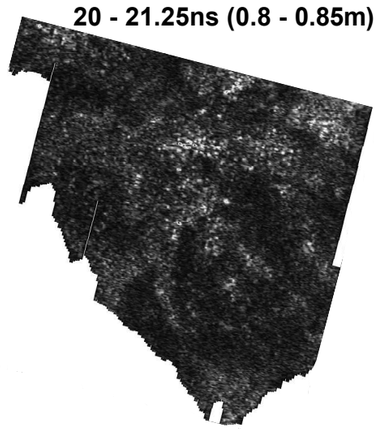
SCALE TRUE AT A3

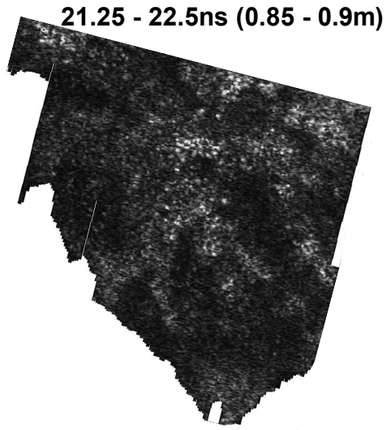
DRAWN BY	CHECKED BY	
DJS	KTD	FIG 06

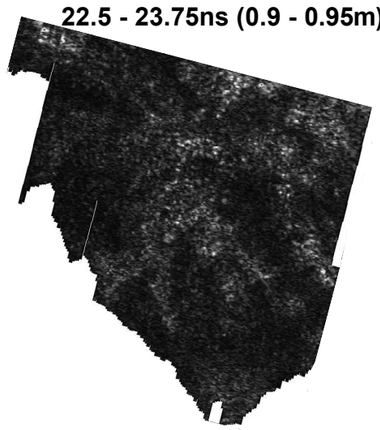


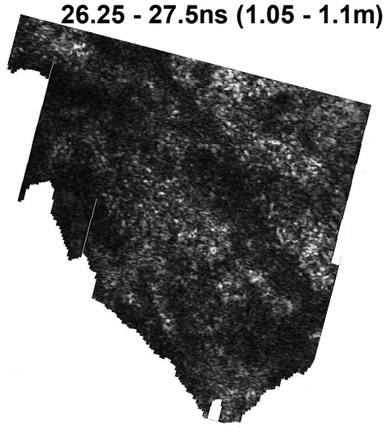


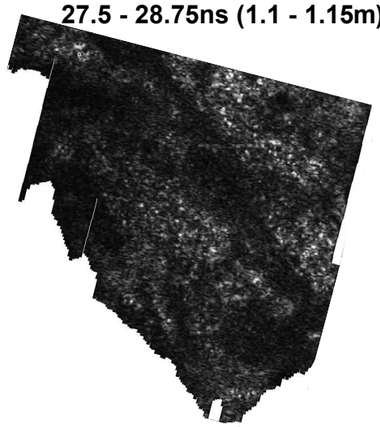


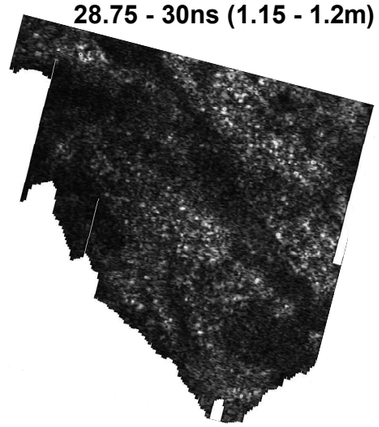












Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar time slices plotted using envelope amplitude

high amplitude reflection

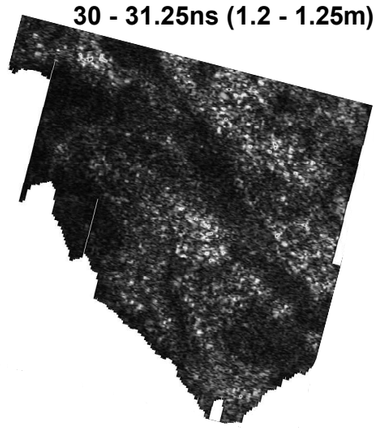
low amplitude reflection

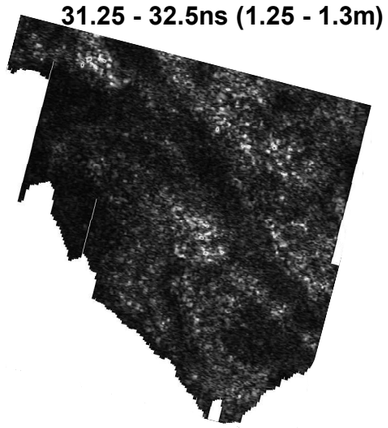
SCALE 1:750

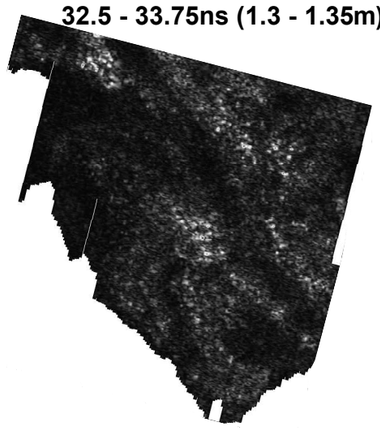
0m 5 10 15 20 25m

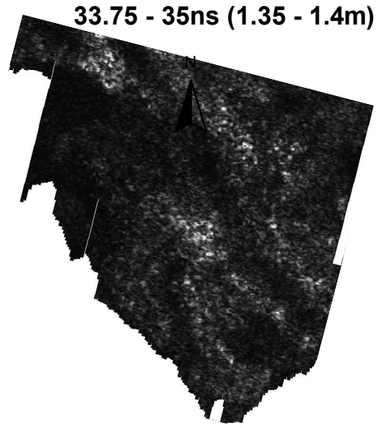
SCALE TRUE AT A3

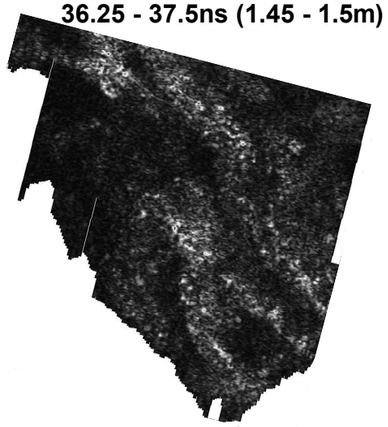
DRAWN BY	CHECKED BY	
DJS	KTD	FIG 07

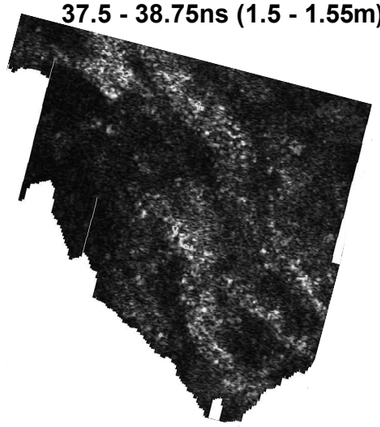


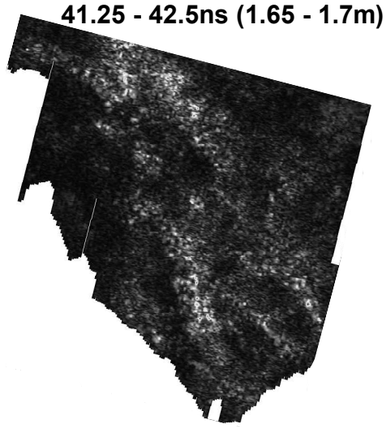












Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar time slices plotted using envelope amplitude

high amplitude reflection

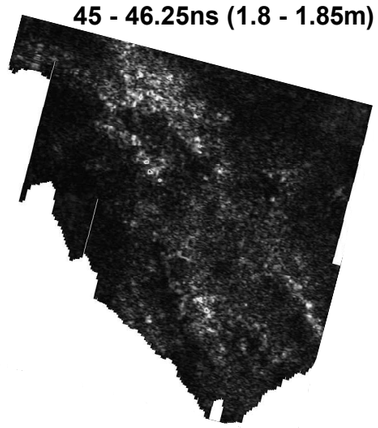
low amplitude reflection

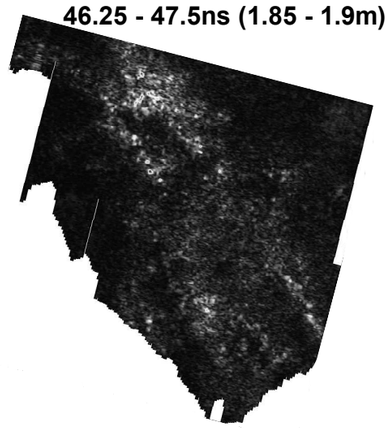
SCALE 1:750

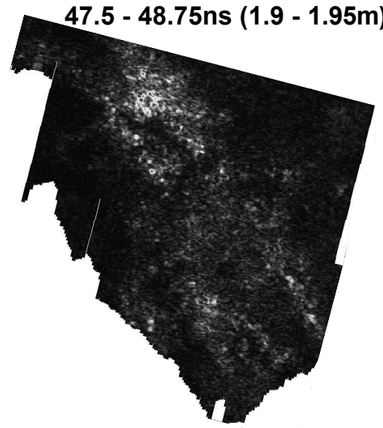
0m 5 10 15 20 25m

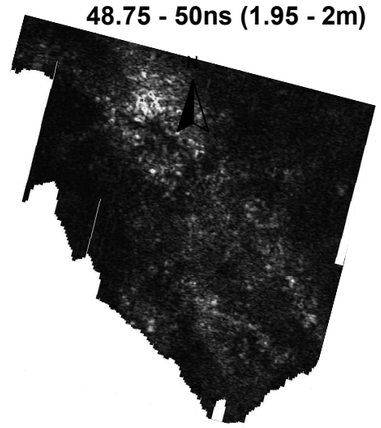
SCALE TRUE AT A3

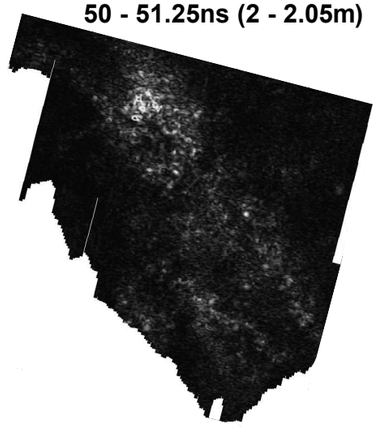
DRAWN BY	CHECKED BY	
DJS	KTD	FIG 08

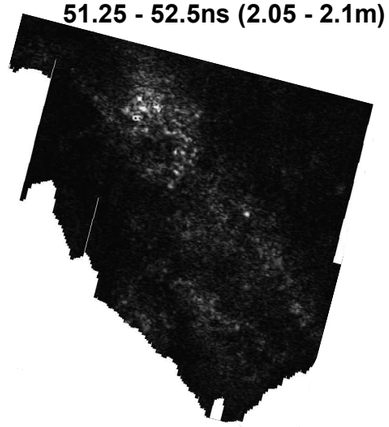


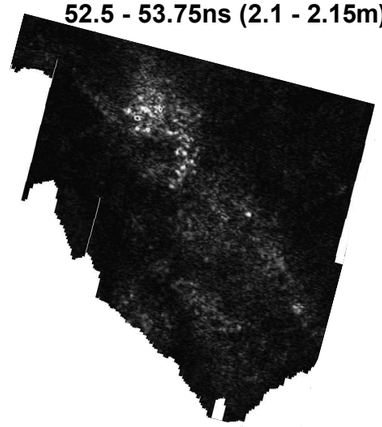


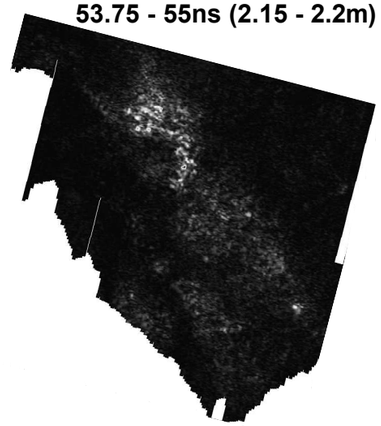


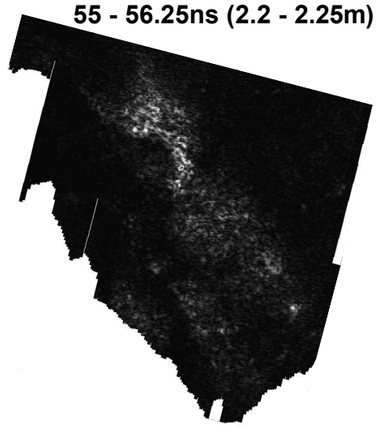


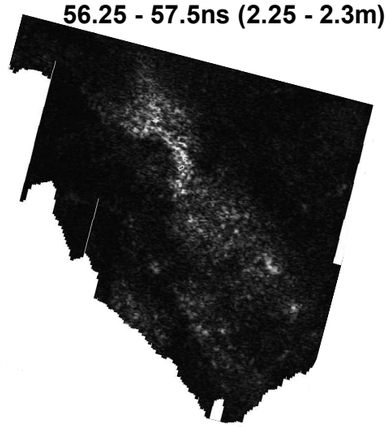


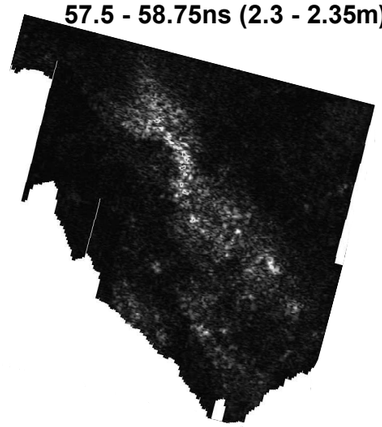


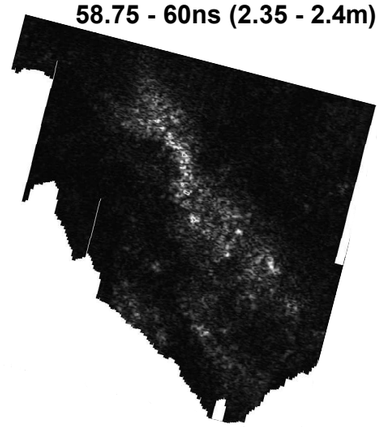












Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar time slices plotted using envelope amplitude

high amplitude reflection

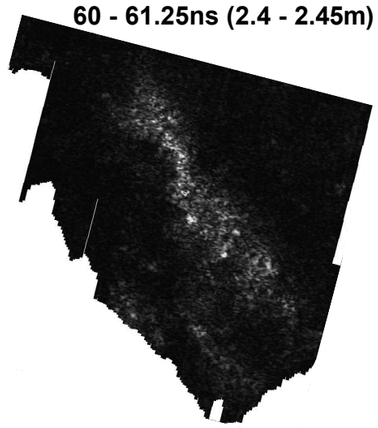
low amplitude reflection

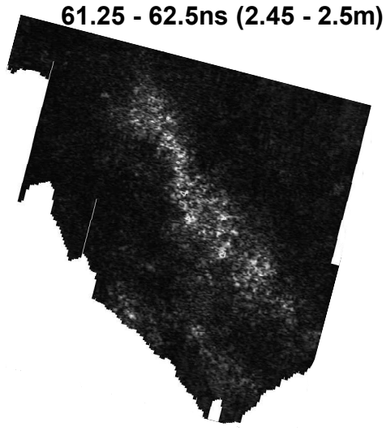
SCALE 1:750

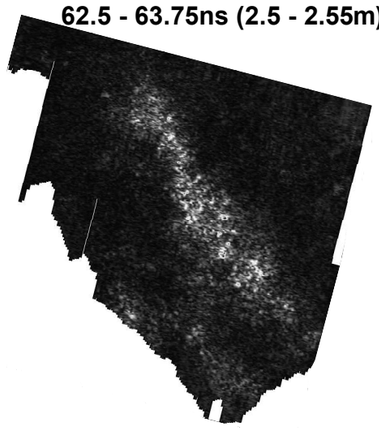
0m 5 10 15 20 25m

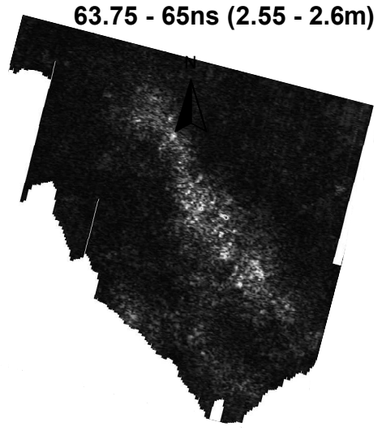
SCALE TRUE AT A3

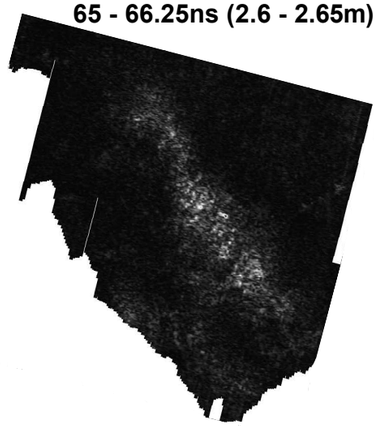
DRAWN BY	CHECKED BY	
DJS	KTD	FIG 09

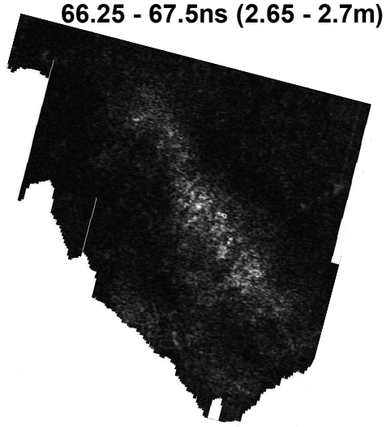


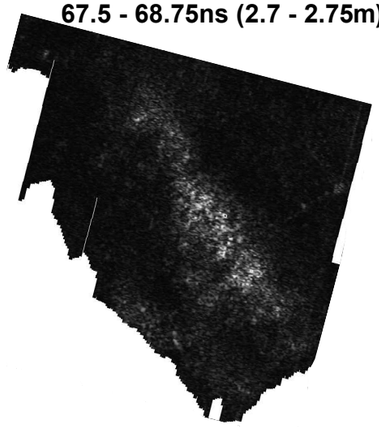


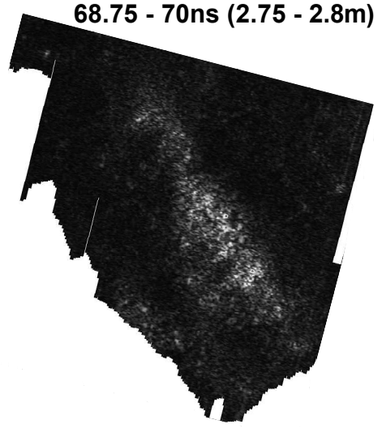


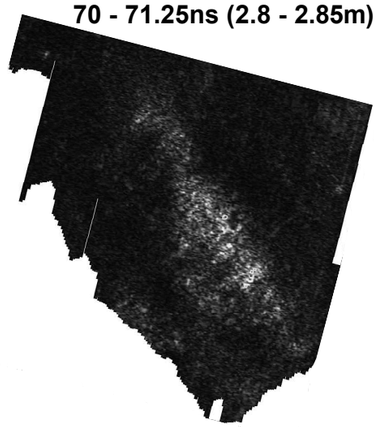


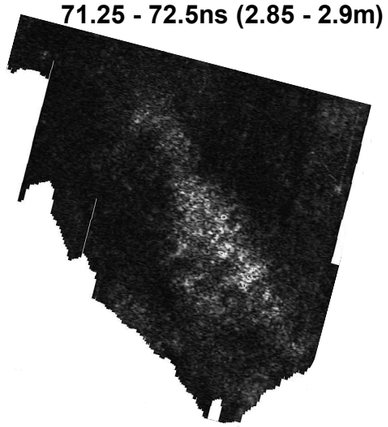


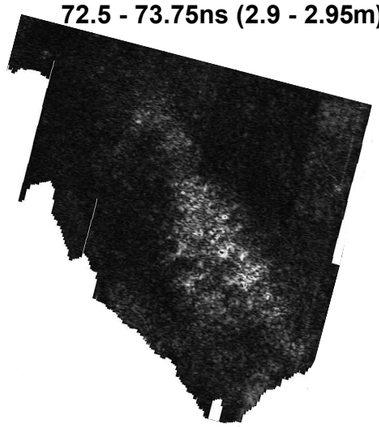


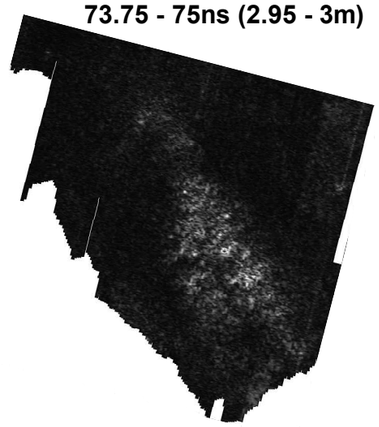












Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar time slices plotted using envelope amplitude

high amplitude reflection

low amplitude reflection

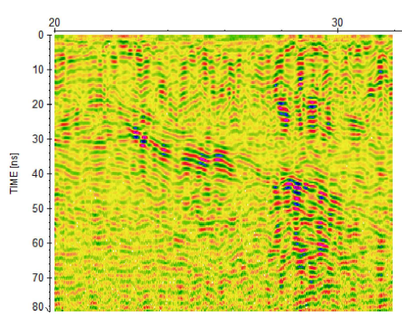
SCALE 1:750

0m 5 10 15 20 25m

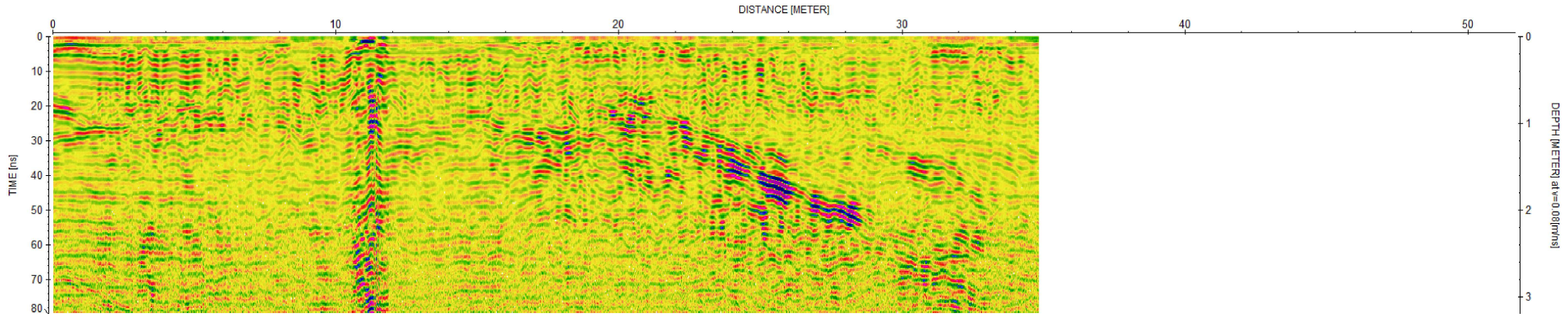
SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
DJS	KTD	FIG 10

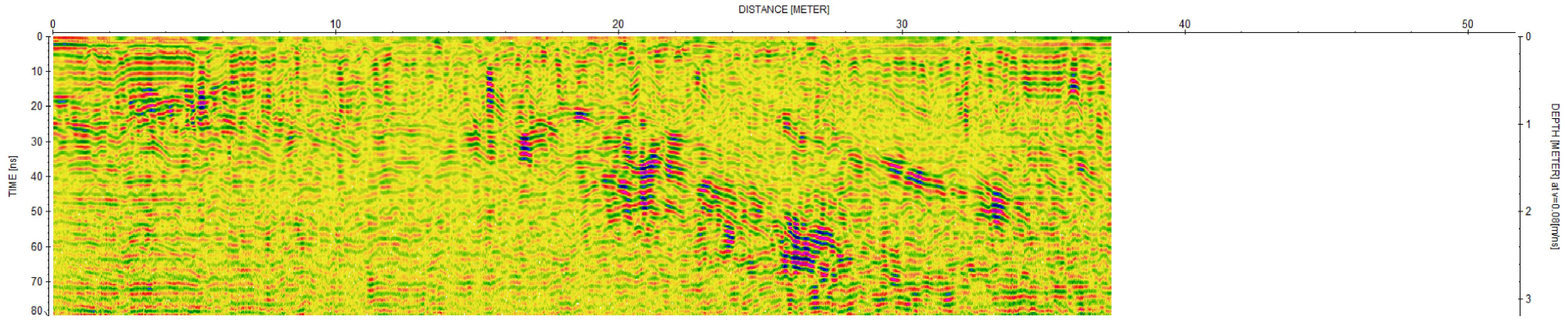
BC001



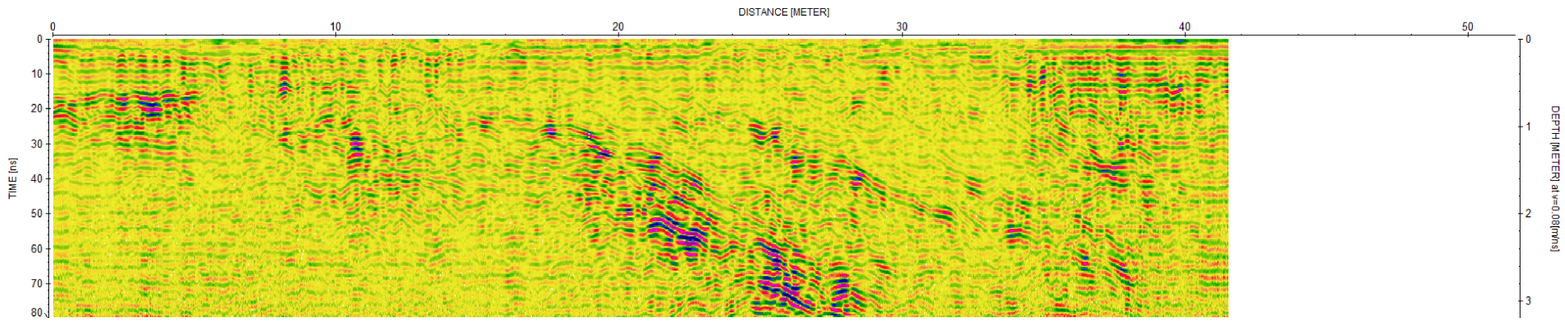
BC011



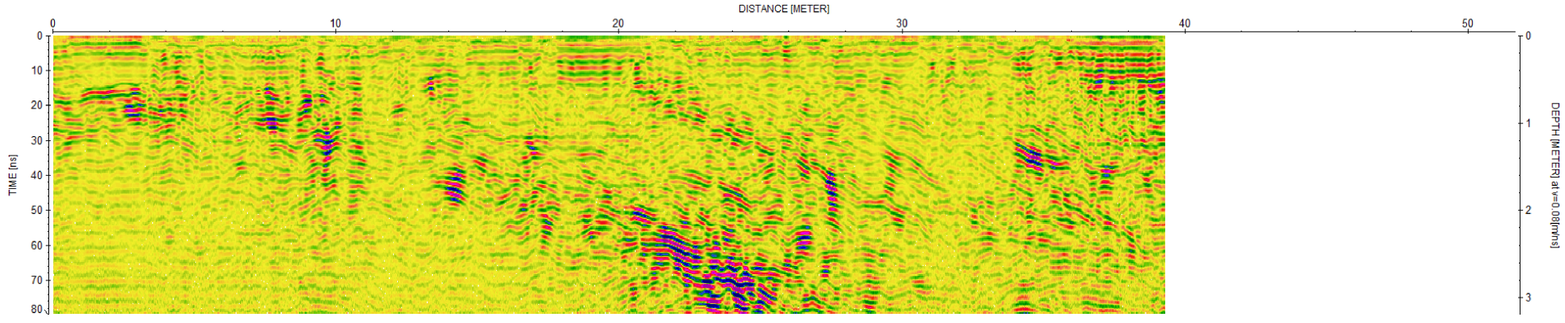
BC021



BC031



BC041



Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar profiles - files BC001, BC011, BC021, BC031 & BC041

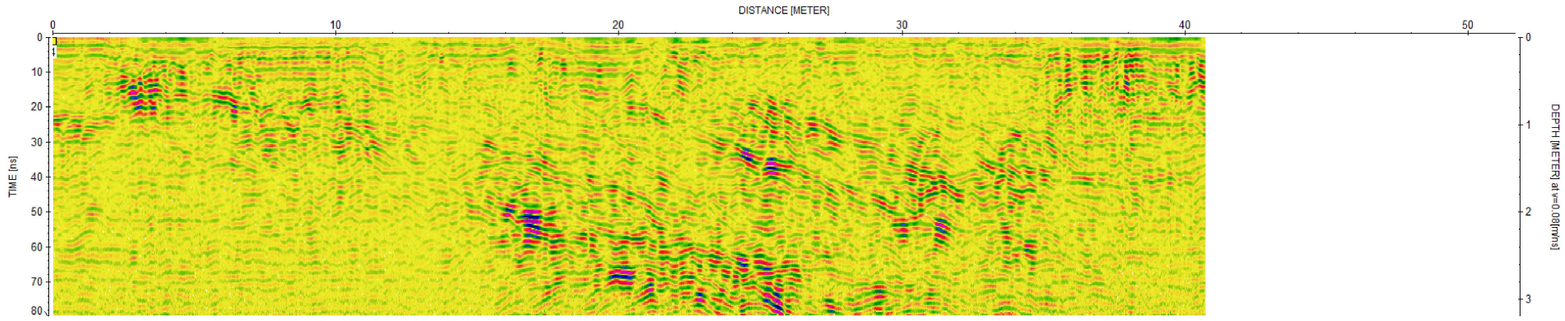
high amplitude reflection (-)

low amplitude reflection

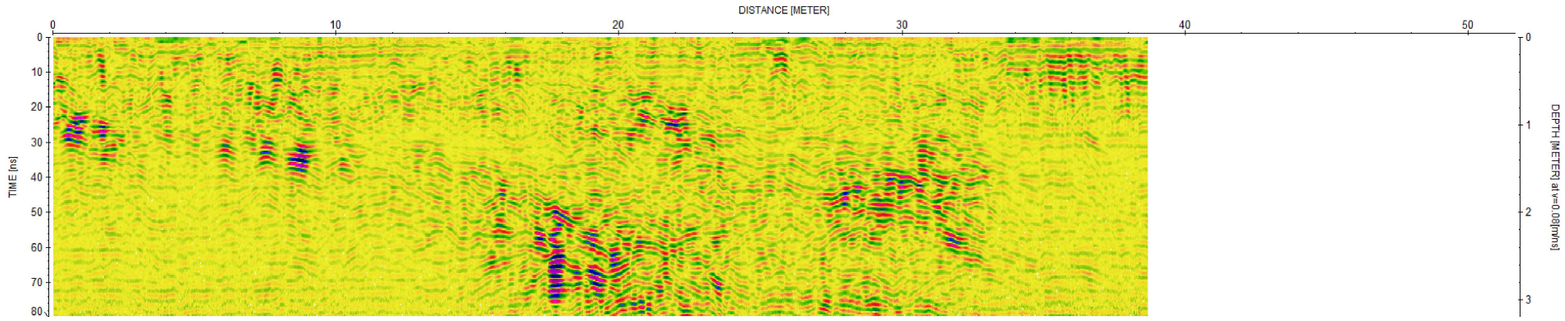
high amplitude reflection (+)

DRAWN BY	CHECKED BY	
DJS	KTD	FIG 11

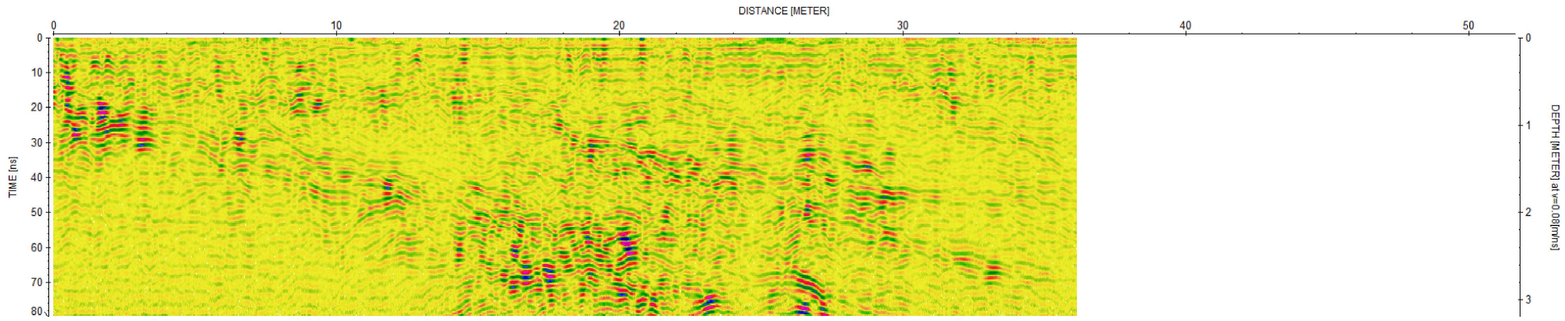
BC051



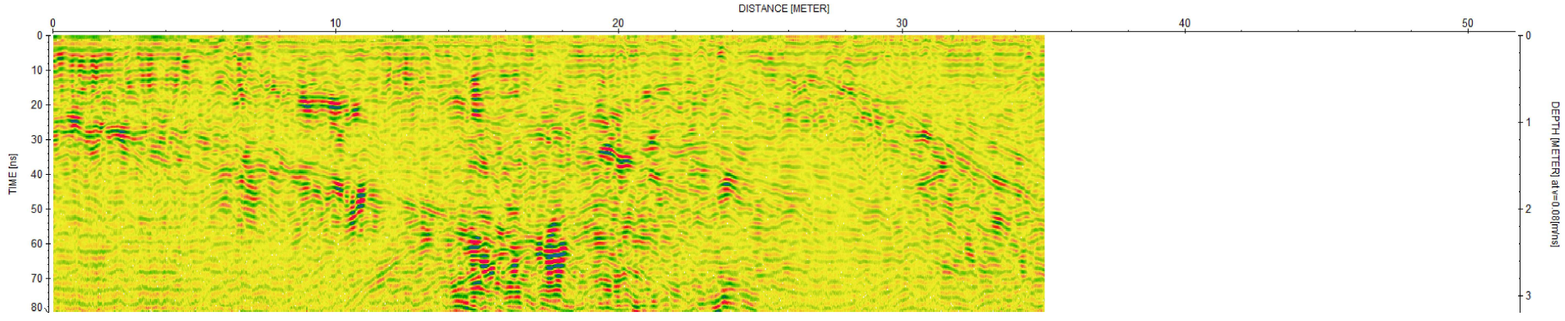
BC061



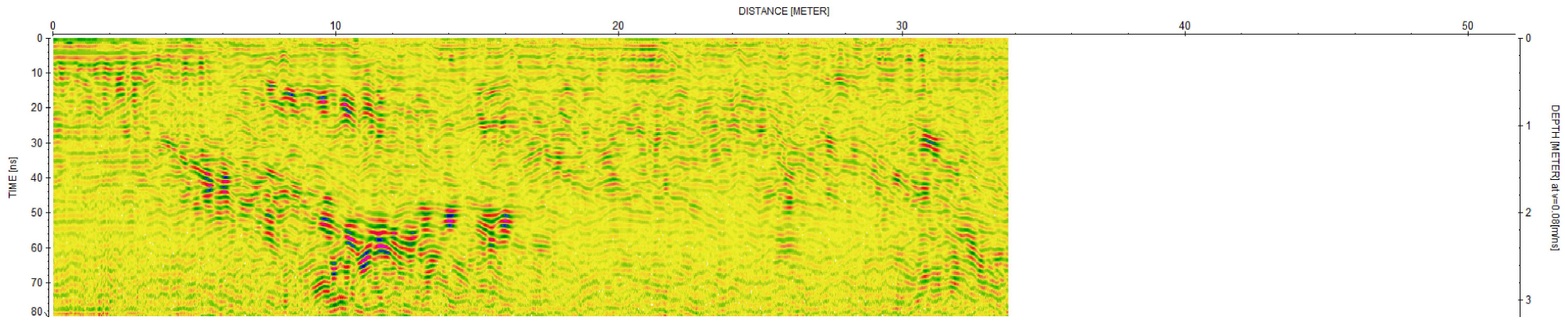
BC071



BC081



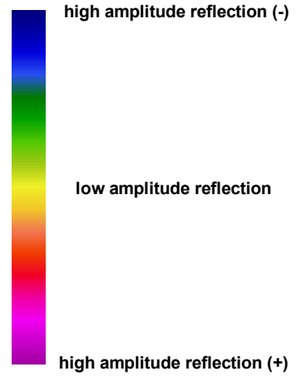
BC091



Archaeological Surveys Ltd
Specialist Geophysical Surveyors

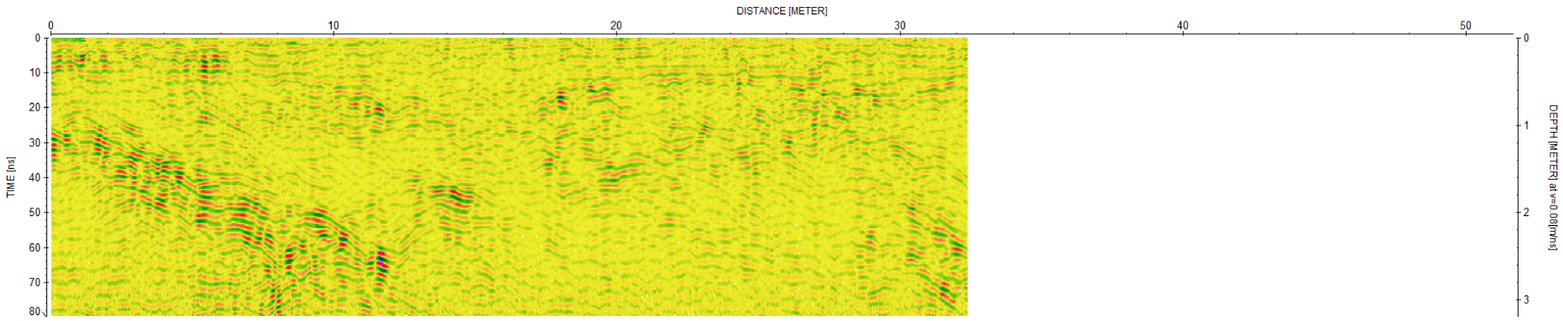
Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar profiles - files BC051, BC061, BC071, BC081 & BC091

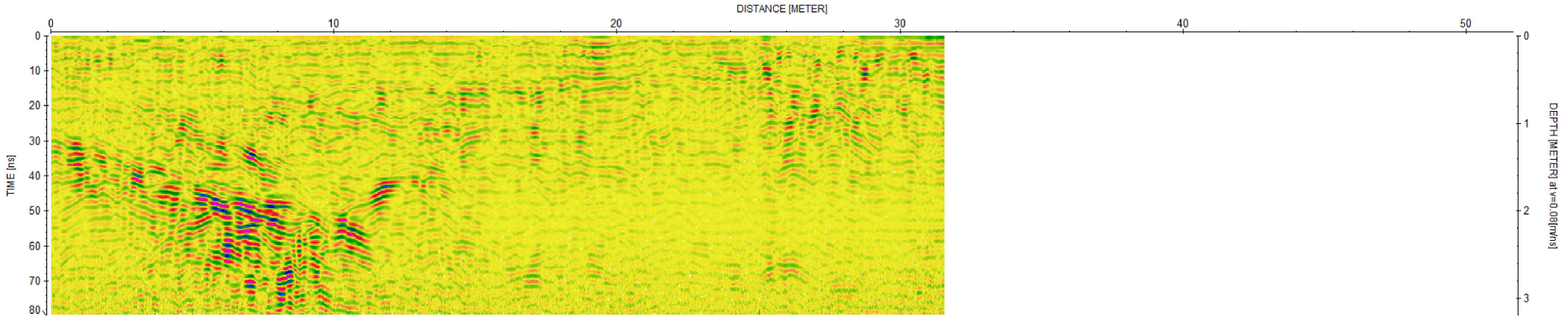


DRAWN BY	CHECKED BY	
DJS	KTD	FIG 12

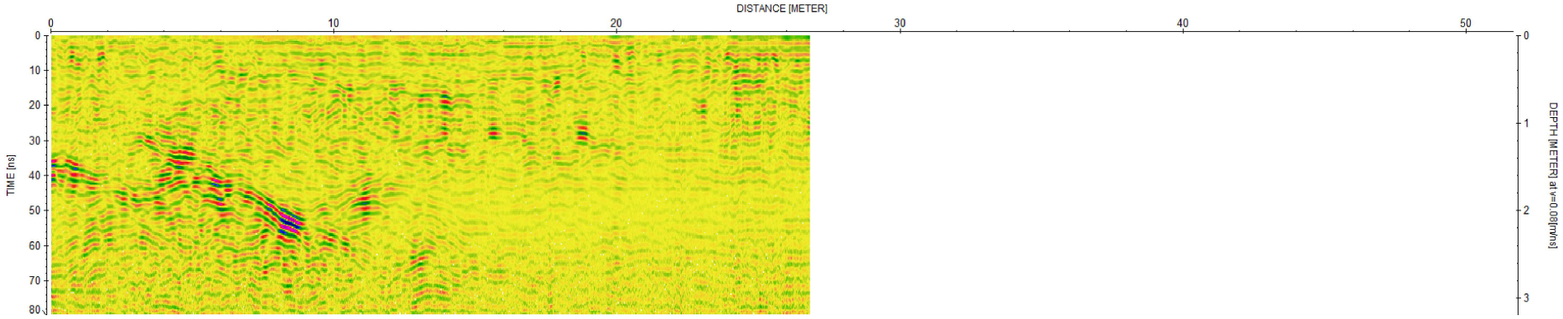
BC101



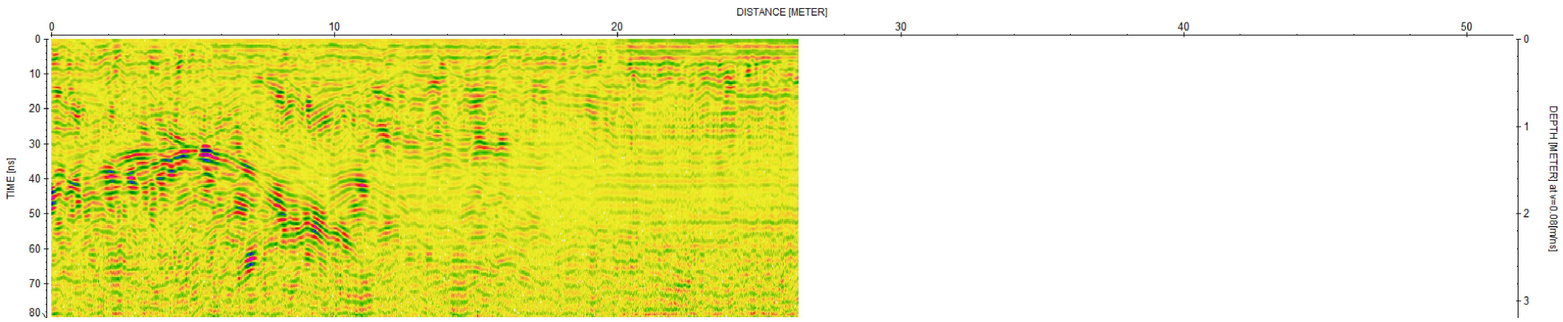
BC111



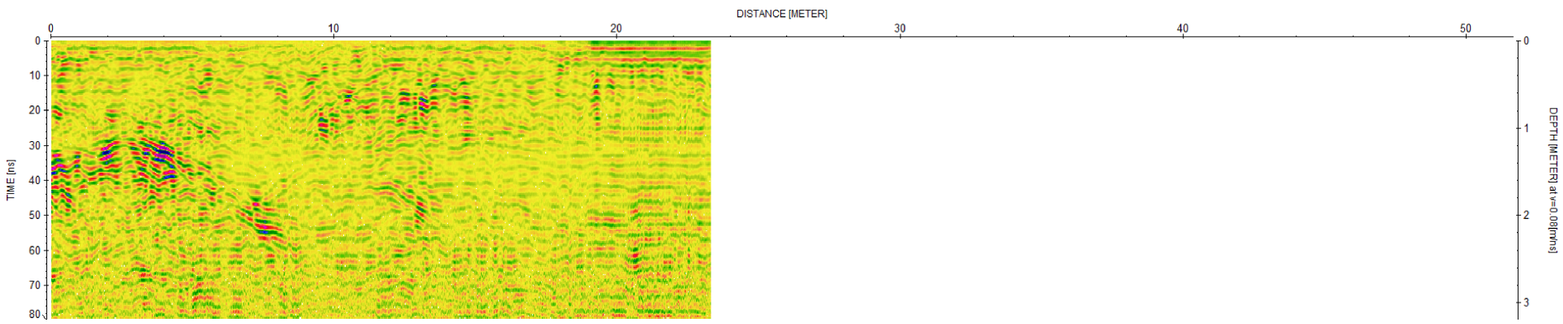
BC121



BC131



BC141



Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar profiles - files BC101, BC111, BC121, BC131 & BC141

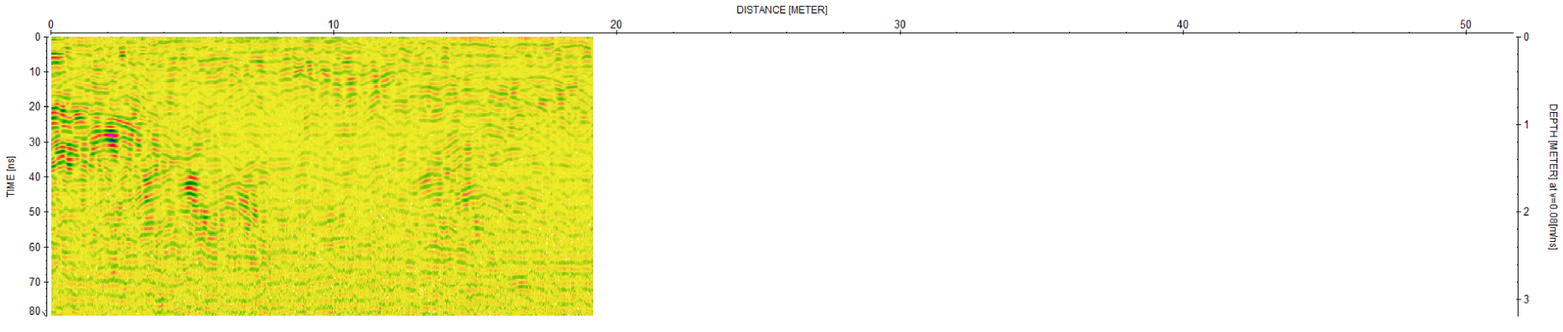
high amplitude reflection (-)

low amplitude reflection

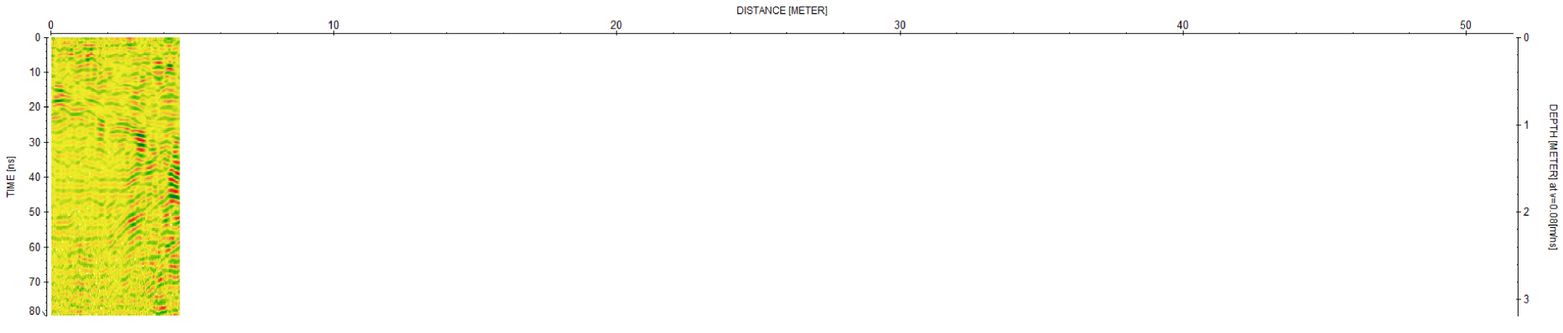
high amplitude reflection (+)

DRAWN BY	CHECKED BY	
DJS	KTD	FIG 13

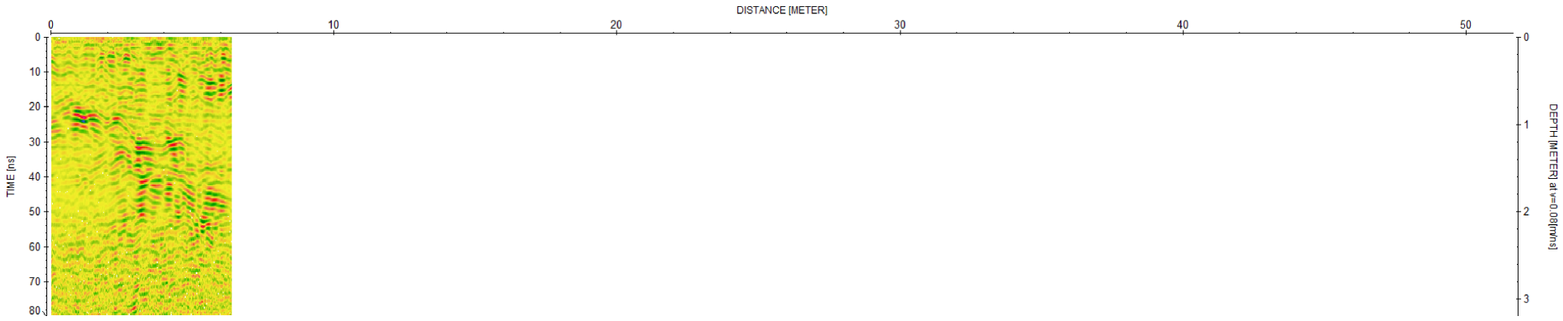
BC151



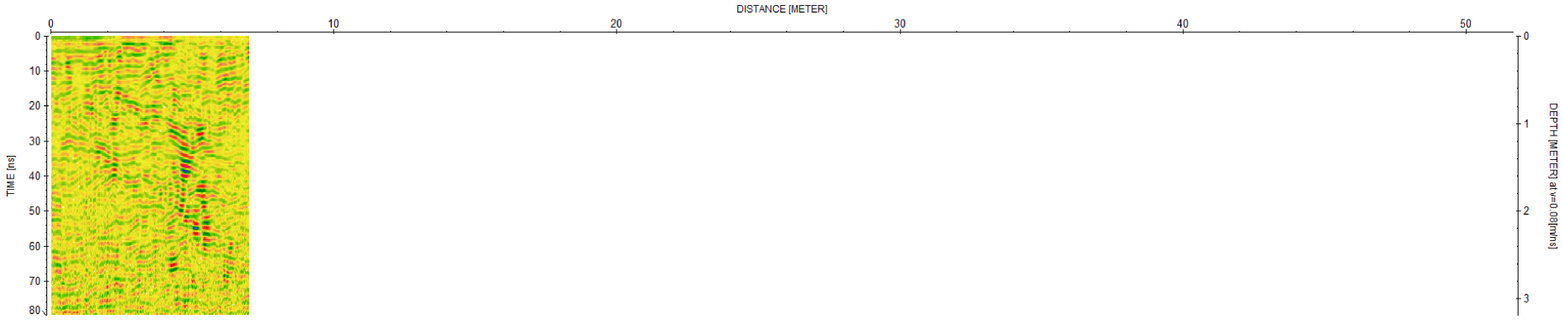
BC161



BC171



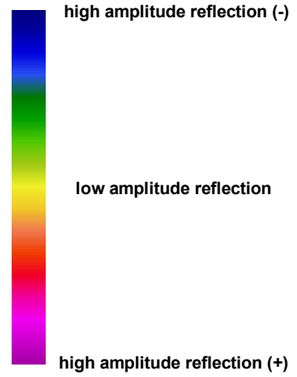
BC181



Archaeological Surveys Ltd
Specialist Geophysical Surveyors

Geophysical Survey
Bagot's Castle
Baginton
Warwickshire

Ground penetrating radar profiles - files BC151, BC161, BC171 & BC181



DRAWN BY	CHECKED BY	
DJS	KTD	FIG 14