GSB Survey No. 08/26

Radcot, Oxfordshire

Time Team Series XVI Programme IV

NGR	SU 284 996.		
Location	The survey area is known as the 'Garrison' and is approximately 6 miles northwest of Stanford and 4 miles southeast of Langford, Oxfordshire.		
District	West Oxfordshire.	**Parish**	Grafton and Radcot.
Topography	Surviving earthworks.		
Current land-use	Pasture.		
Soils	Kelmscot association (832), soils consisting of river terrace drift (SSEW 1983).		
Geology	Limestone, silt and sand (IGS sheet 253).		
Archaeology[#]	Radcot (Rocote) is mentioned from Domesday. A castle was situated from the early 12th century to control the crossing over the Thames. Previous excavations showed that the keep was demolished in the late 13th century. The 'Garrison' is likely to be so called from the fortification of Radcot in 1142 by Matilda.		
Survey Methods	Gradiometry, Resistance, Ground Penetrating Radar (GPR).		

Aims

To locate any detectable archaeology within the survey areas. The work forms part of a wider archaeological assessment being carried out by Channel 4's **Time Team**.

Summary of Results

All three geophysical techniques have detected the footprint of the castle keep (the 'Garrison'); in particular the GPR results provide a remarkably clear picture of the structural remains including a central pier. A number of other buildings have been identified within the immediate vicinity of the keep.

Further buildings to the east have also been located, including a chapel, with an apsidal end, and a possible kitchen building. A Civil War moat can be seen bisecting the survey area, as can the ditch surrounding the site.

Project Information

Project Co-ordinator: Emma Wood BSc MIfA
Project Assistants: J Adcock, Dr H Chapman FSA MIfA & Dr J Gater FSA MIfA
Date of Fieldwork: 13th – 15th May 2008
Date of Report: 8th December 2008

[#] Taken from Mower *et al.*

Survey Specifications

Method

The survey grid was set out using tapes by **GSB Prospection Ltd**. and tied in to the Ordnance Survey (OS) grid using a Trimble R8 Real Time Kinematic (RTK) GPS system by **Dr Henry Chapman**.

Technique	Traverse Separation	Reading Interval	Instrument	Survey Size
Magnetometer – Detailed (Appendix 1)	1m	0.25m	Bartington Grad 601-2	0.4ha
Magnetometer – Detailed (Appendix 1)	0.5m	0.1m	Foerster Ferex 4.032, Trimble R8 RTK GPS	0.46ha
Resistance – Twin Probe (Appendix 1)	1m	1m	Geoscan RM15 Meter and MPX15 Multiplexer	0.27ha
GPR (Appendix 1)	0.5m	0.25m	Sensors and Software Noggin Plus	0.13ha

Data Processing

	Magnetic	Resistance	GPR
Tilt Correct	Y	N	N
De-stagger	Y	N	N
Interpolate	Y	Y	N
Filters	N	N	De-wow/DC-shift, Bandpass, Background removal

Presentation of Results

Report Figures (Printed & Archive CD):	Location plots, data plots and interpretation diagrams (Figures 1-11).
Reference Figures (Archive CD):	Data plots and interpretations at 1:500/1000 - for reference and analysis. (Figures A1-A6)
Plot Formats:	See Appendix 1: Technical Information, at end of report.

General Considerations

Conditions for survey were good as the ground cover consisted of short pasture with no obstructions.

Small scale ferrous responses within the magnetic data are likely to be of modern origin and will not be discussed within the report unless deemed relevant. These responses can be seen in the XY data plots (on the Archive CD) as sharp peaks.

Two instruments were used to collect magnetic data; Bartington Grad 601-2 and Foerster Ferex 4.032; the latter giving a greater resolution. Step correcting is not required with the Foerster, as the attached GPS gives real-time corrections. The magnetic results are discussed together but the data from both instruments can be seen in Figures 2-4.

Any depths referred to in the interpretation of GPR data *are only ever an approximation*. The conversion from delay time to depth depends upon the propagation velocity of radar waves through the ground; this can vary significantly both laterally and vertically on sites such as this. A velocity of 0.08m/ns has been used after an iterative analysis process of fitting hyperbolic curves to point-source reflections. Where there is a strong electromagnetic contrast, the GPR signal can be inter-reflected or reverberated, producing a delay in the reflection of the signal. This is termed 'ringing' and happens, to some extent, with all reflections resulting in a greater apparent depth than actually exists. As a result, it is often not possible to detect the base of features; only the tops of buried deposits are detected with any kind of certainty (Annan 1996).

Results of Survey

1. Gradiometer Survey

1.1 The magnetic data clearly show the footprint of the castle keep; the wall foundations are visible as strong negative anomalies. The 'Garrison' (1) is well defined and compares with both the resistance and GPR surveys. An interior wall and a central pillar can also be seen within the structure. A number of anomalies can also be seen to the north; these may represent structures attached to the building. Some of these features also correspond to the GPR data.

1.2 Further wall foundations can be seen at (2) and (3) to the east of the keep. These are thought to be buildings associated with the 'Garrison'. Anomalies (2) represent a chapel and correspond with (H) in the GPR data (see paragraph 3.4). Foundations surrounding (3) proved to be of a more domestic nature when excavated; one of the buildings was thought to be a kitchen. Anomalies within the wall foundations may indicate demolition spread or areas of burning.

1.3 A curvilinear trend (4) to the west of the 'Garrison' is difficult to interpret archaeologically. It may be contemporary with the keep, perhaps representing garden features; it could, however, be of an earlier or later date.

1.4 Running through the data on a north-south alignment is the Civil War moat (5); it is clearly visible in the 'Foerster' data (Figure 2) over a wider area. This feature is also seen in the GPR data (see paragraph 3.3).

1.5 Anomaly (6) lies on a differing alignment to the other features in the data; it may be a ditch pre-dating the castle, though this interpretation is tentative.

1.6 Other negative responses may have an archaeological origin though some may simply be topographic effects. The ditch surrounding the main site can be seen as a negative anomaly. There are very few anomalies of a ferrous nature throughout the data, perhaps indicating that metal detectorists have been active; some however are located with the ditches and are likely to be modern material.

2. Resistance Survey

2.1 Time permitted only a small section of the site to be investigated by the resistance survey. The high resistance anomaly (a) is part of the castle keep. A small area of high resistance to the north is likely to be an associated building, as seen in the other techniques.

2.2 Anomalies (b) are again consistent with the other surveys and show the chapel and domestic buildings; they are, however not as clearly defined as in the magnetic or radar data.

2.3 A band of low resistance (c) on a north-south alignment is that of the Civil War moat.

3. Ground Penetrating Radar Survey

3.1 The footings of the tower are the dominant feature of this dataset. Clear breaks can be seen in the wall lines at (A) and, owing to the sharply defined edges, these are thought to be potential doorways rather than robbing of construction material. To a depth of around 1.0m a central division (B) is apparent, splitting the floorplan of the keep in half. Beyond 1.0m the feature

shrinks to a smaller, more confined high amplitude anomaly (C) originally assumed to be a central foundation pad. Excavation confirmed the linear anomaly to be of a relatively superficial construction overlying a far more substantial deposit of stone, presumably to support the upper floor. From the time-slices (Figures 8 & 9) and 3D model (Figure 10, also see animations on Archive CD) it can be seen that this central pad has a similar extent to the most substantial of the wall foundations, suggesting it was designed for a considerable load.

3.2 Immediately adjacent to the keep is a broad area of increase response (D), within which there are numerous high amplitude anomalies. Despite hints of rectilinearity, it is not possible to define individual structures or a layout; whilst it is assumed that this zone has structure within it, it has not been possible to differentiate potential demolition spread from *in-situ* remains. An exception to this is rectilinear anomaly (E). This closely flanks the castle walls on two sides but it is not clear whether it is remnants of an earlier structure or some form of out-building.

3.3 Structure (F) is relatively clear and looks to be an ancillary building associated with the keep. It appears to have been truncated by the later civil war moat (G), as there is no obvious end wall to the southeast. It is possible that this has simply been robbed out.

3.4 Numerous high amplitude anomalies and trends east of, and on a shared rectilinear alignment to the keep are thought to be earlier manorial structures which the Civil War moat may also have truncated. In this region the buildings are poorly defined with the exception of (H) and (I). It was postulated that the former may be a chapel, possibly with an apsidal east end; excavation revealed a piece of stained glass within the remains, lending weight to this interpretation. The latter structure (I) is thought to have had a more domestic function given that excavations revealed a hearth.

4. Conclusions

4.1 Past geophysical work had already demonstrated that magnetometry worked well at Radcot. The present, time-limited project helped confirm these earlier findings; both the Bartington and the Foerster instruments have provided a clear picture of the 'Garrison' and surrounding buildings.

4.2 Sample resistance survey further demonstrated that this technique also responds well on the site; more extensive survey would clearly be beneficial.

4.3 Of the three geophysical techniques the GPR produced the most striking results. The time-slices and animations are remarkably detailed: the three-dimensional model clearly demonstrates the power of the technique on a site like Radcot.

List of Figures

Report Figures

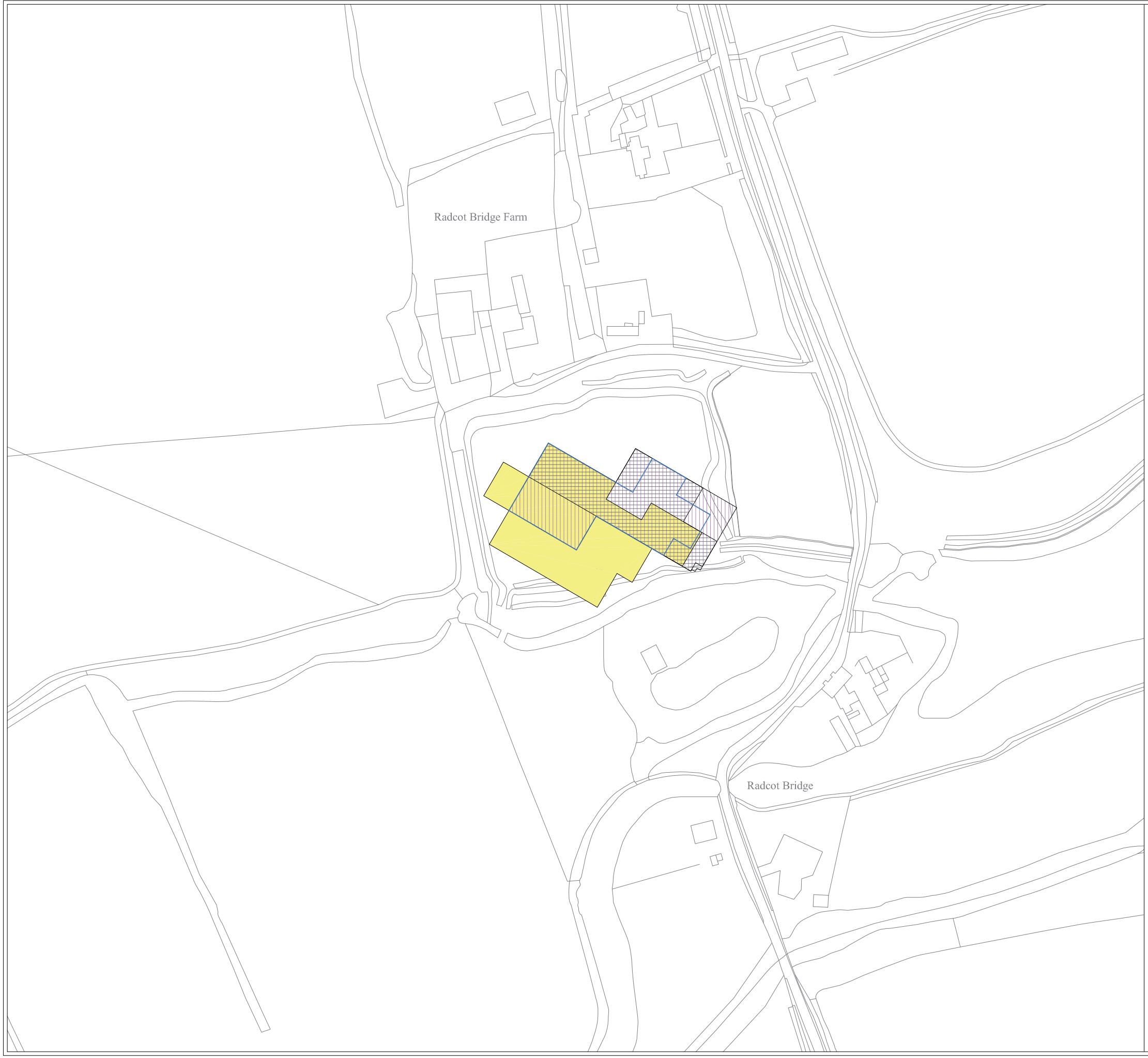
Reference Figures on CD

References

IGS — *Sheet 253, Witney.* Solid and Drift Edition. 1:50000, Institute of Geological Sciences.

Mower, J. Knappett, B. Ord, L. 2008 — *Proposed Archaeological Evaluation at Radcot, Oxfordshire*. Unpublished Report.

SSEW 1983 — Soils of England and Wales. *Sheet 1 Northern England*. Soil Survey of England and Wales.



0 metres 80

Gradiometer Survey - Ferex

Gradiometer Survey - Grad 601-2

Resistance Survey

GPR Survey

GSB PROSPECTION Ltd.

2008/26 Radcot

Location of Survey Areas

Figure 1

0 metres 40

10
SD
-10

GSB PROSPECTION Ltd.

2008/26 Radcot

Gradiometer (Ferex) Greyscale

Figure 2

0 metres 40

5
nT
-2

GSB PROSPECTION Ltd.

2008/26 Radcot

Gradiometer (Grad 601-2) Greyscale

Figure 3

0 metres 40

Castle

Wall Lines

Archaeology

Civil War Moat

?Archaeology - Positive Response

?Archaeology - Negative Response

Trend

Boundary Ditch

Ferrous

GSB PROSPECTION Ltd.

2008/26 Radcot

Combined Gradiometer Interpretations

Figure 4

0 metres 40

5
nT
-2

GSB PROSPECTION Ltd.

2008/26 Radcot

Resistance Greyscale

Figure 5

0 metres 40

High Resistance - Rubble Remains

Trend

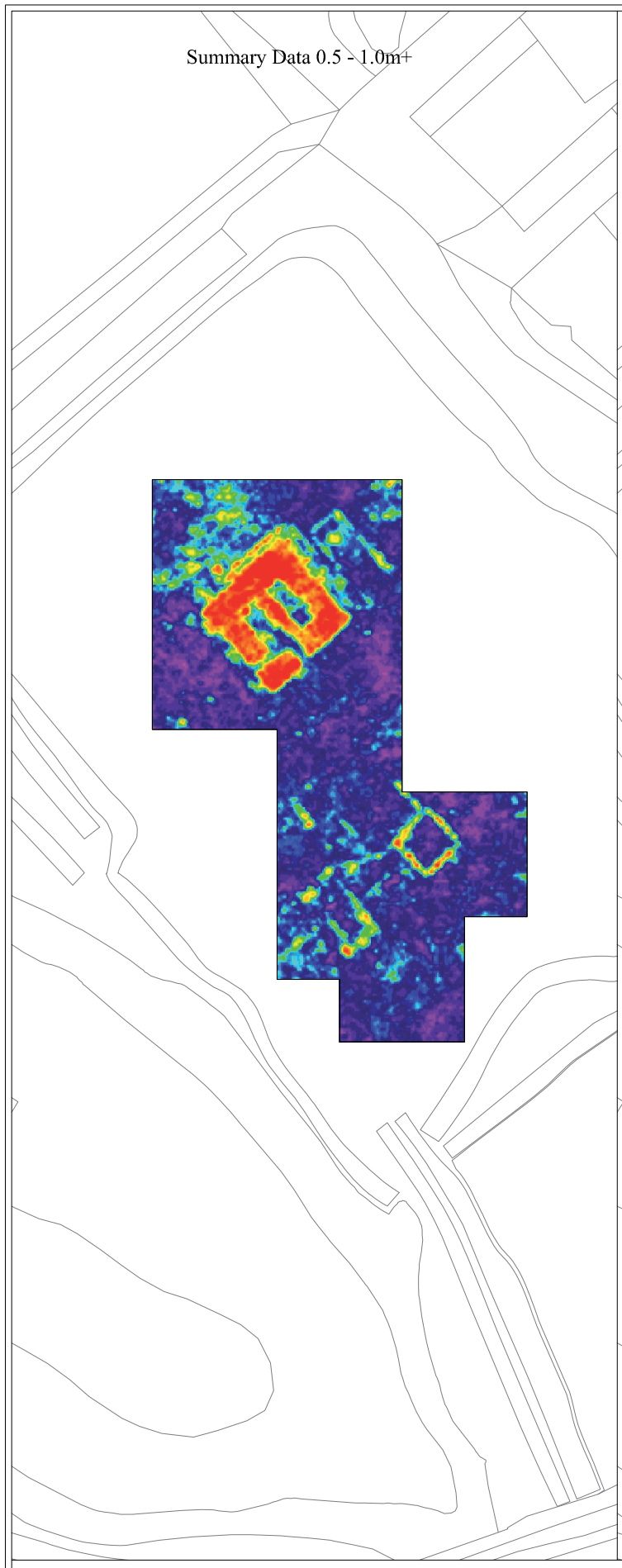
Low Resistance

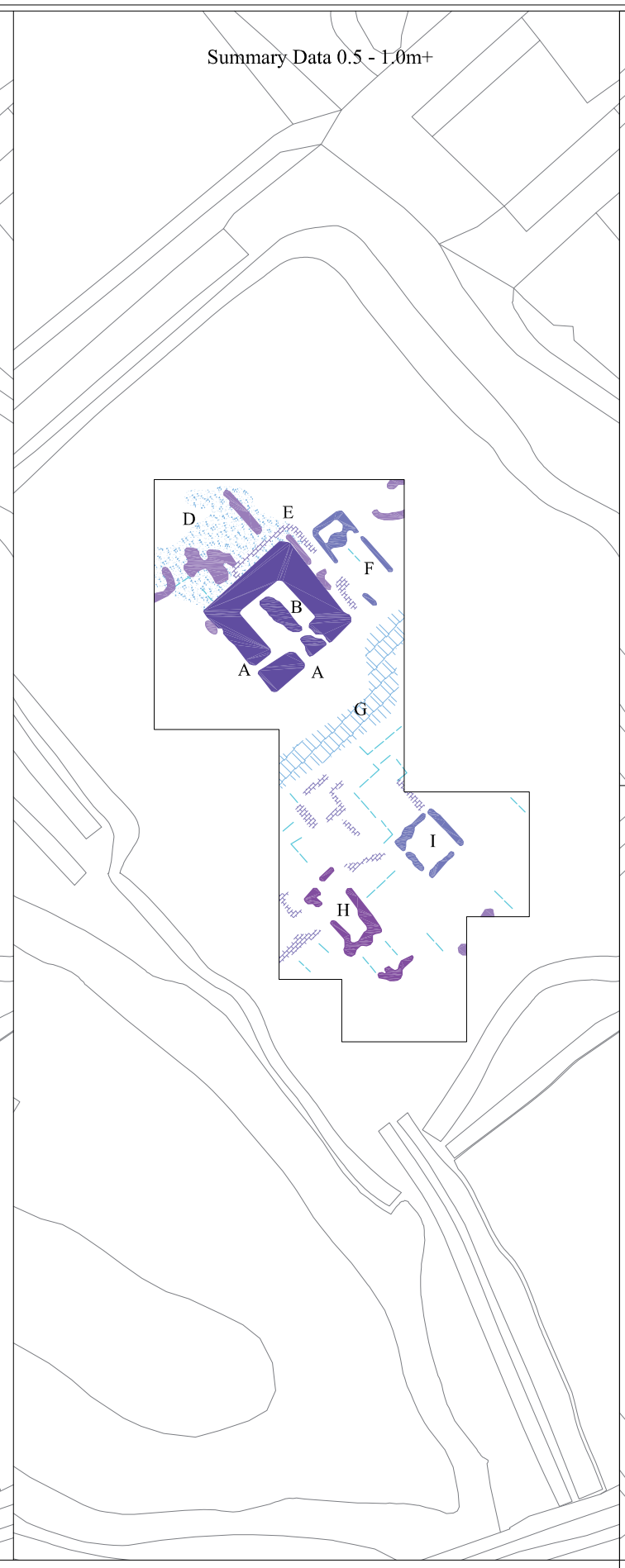
GSB PROSPECTION Ltd.

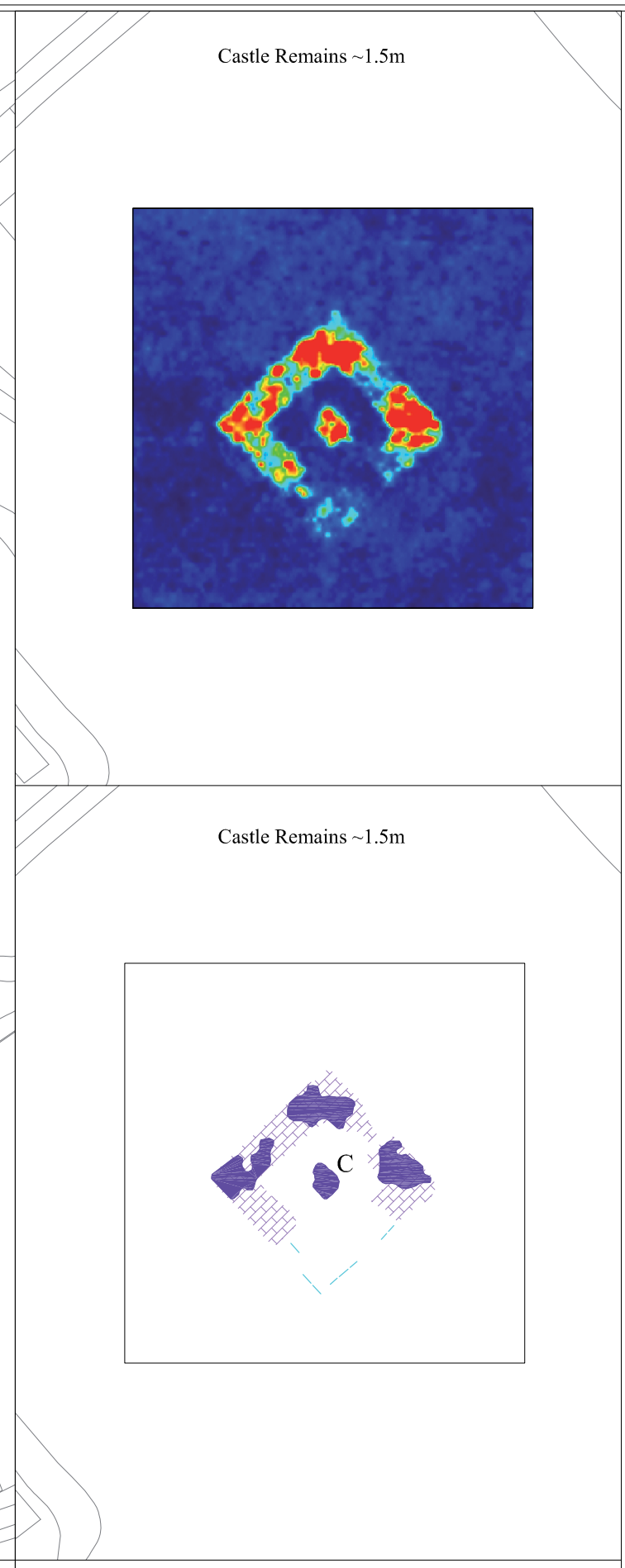
2008/26 Radcot

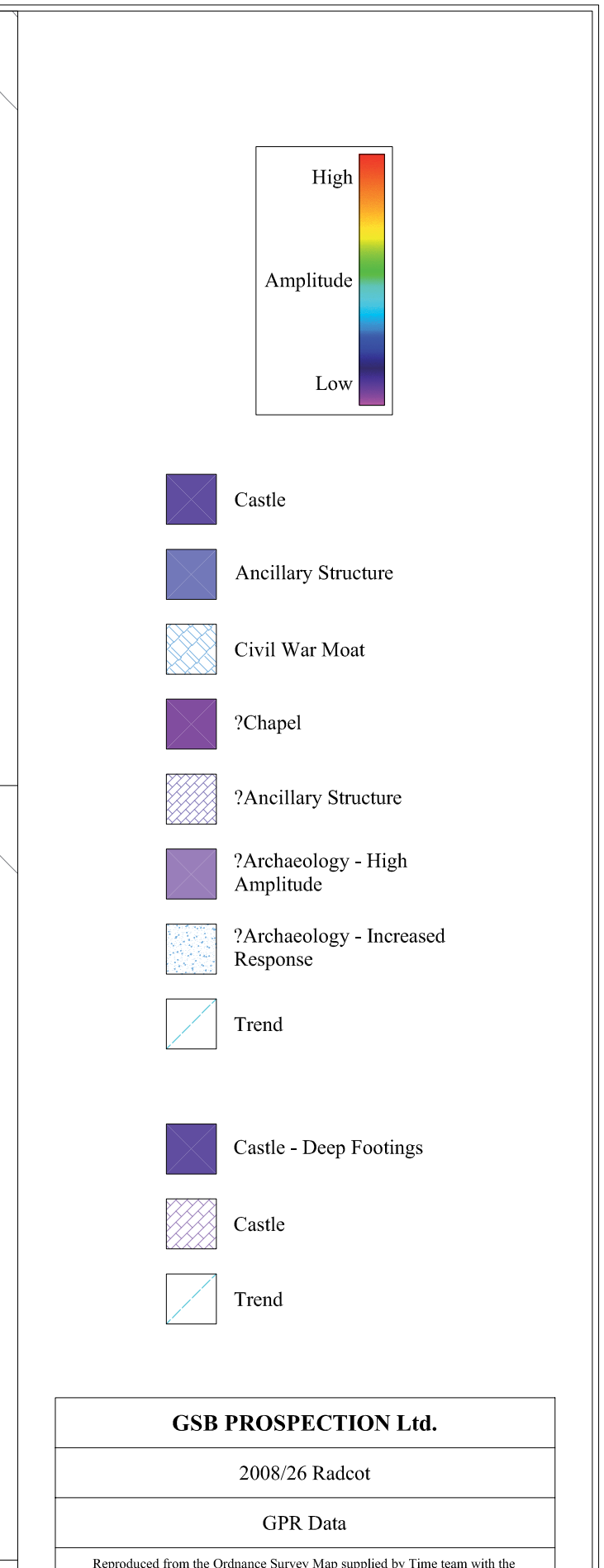
Resistance Interpretation

Figure 6









0 metres 40

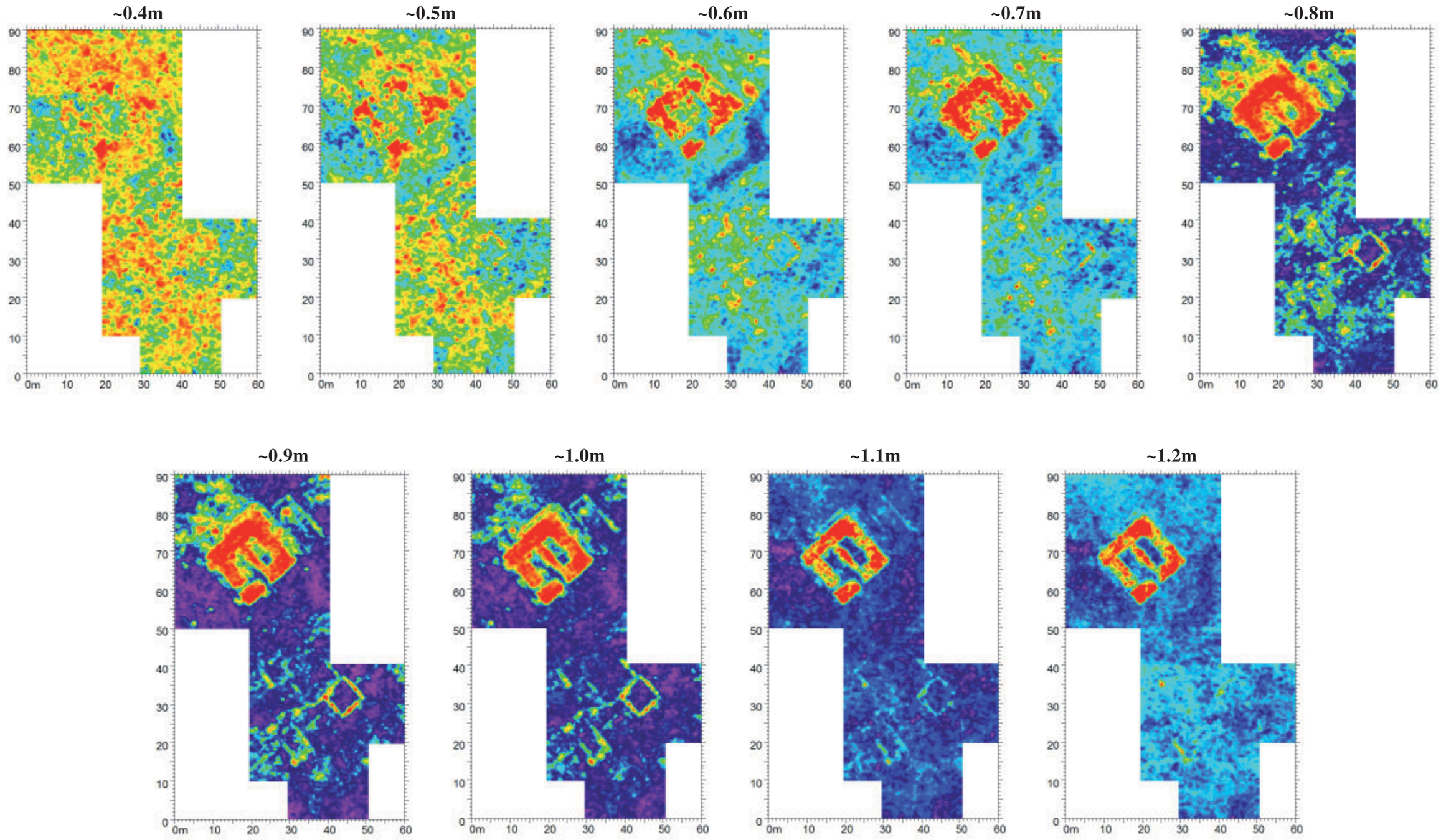
0 metres 25

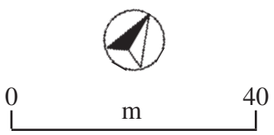
GSB PROSPECTION Ltd.

2008/26 Radcot

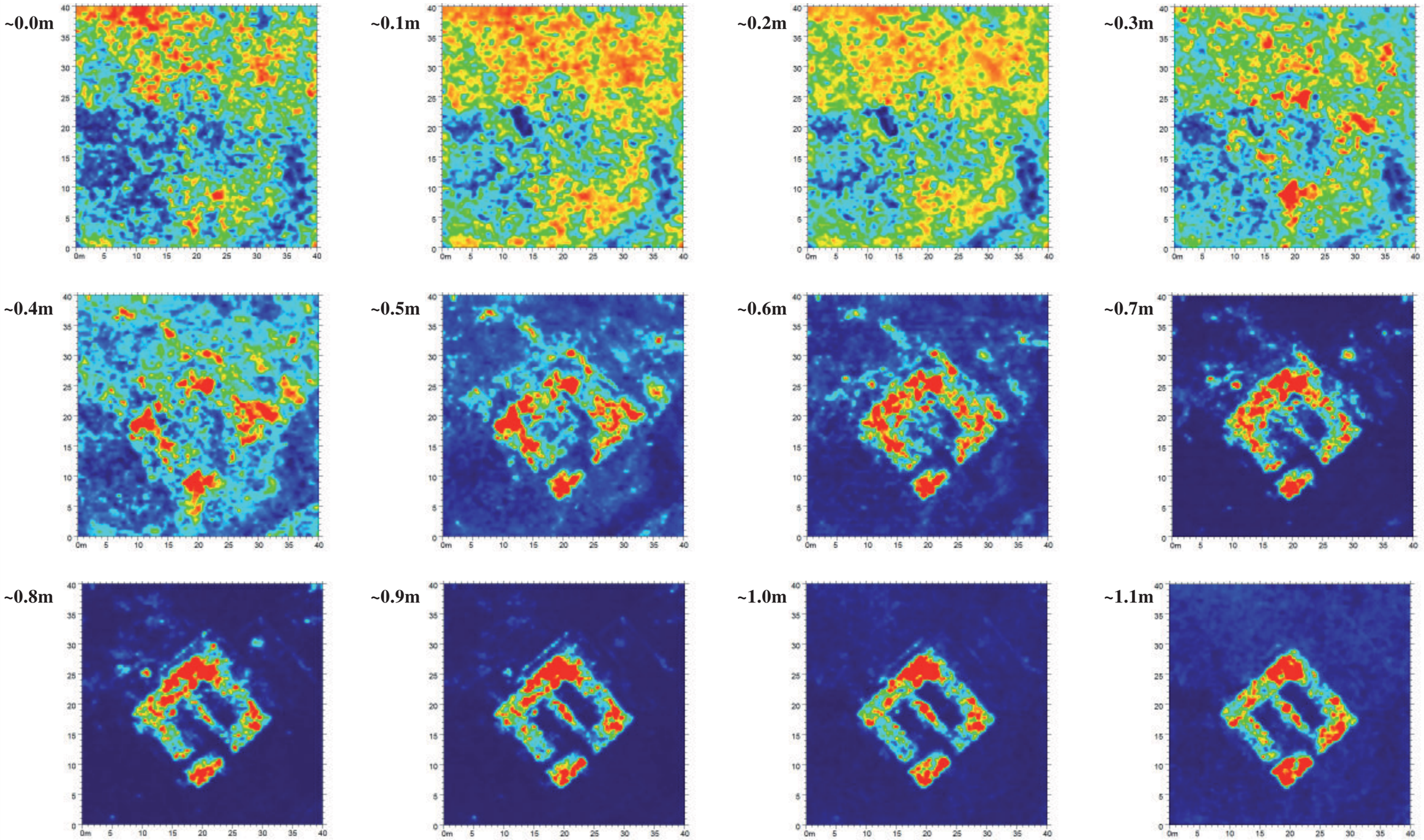
GPR Data

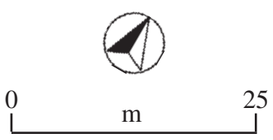
Figure 7



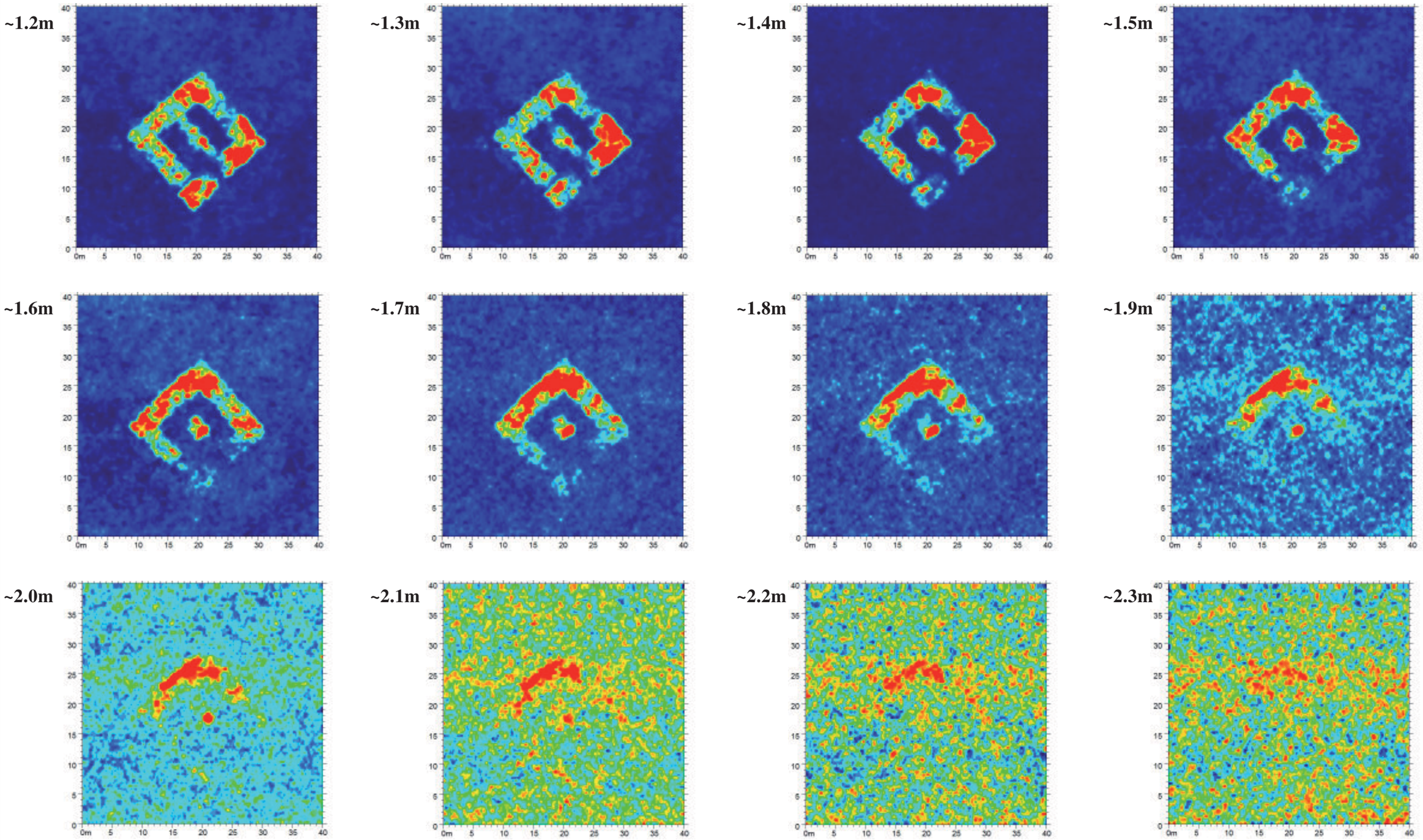


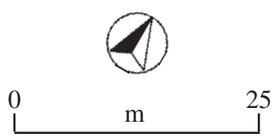
GSB Prospection Ltd.
2008/26 Radcot
GPR Data - Castle Environs: Enhanced Time-slices
Figure 8



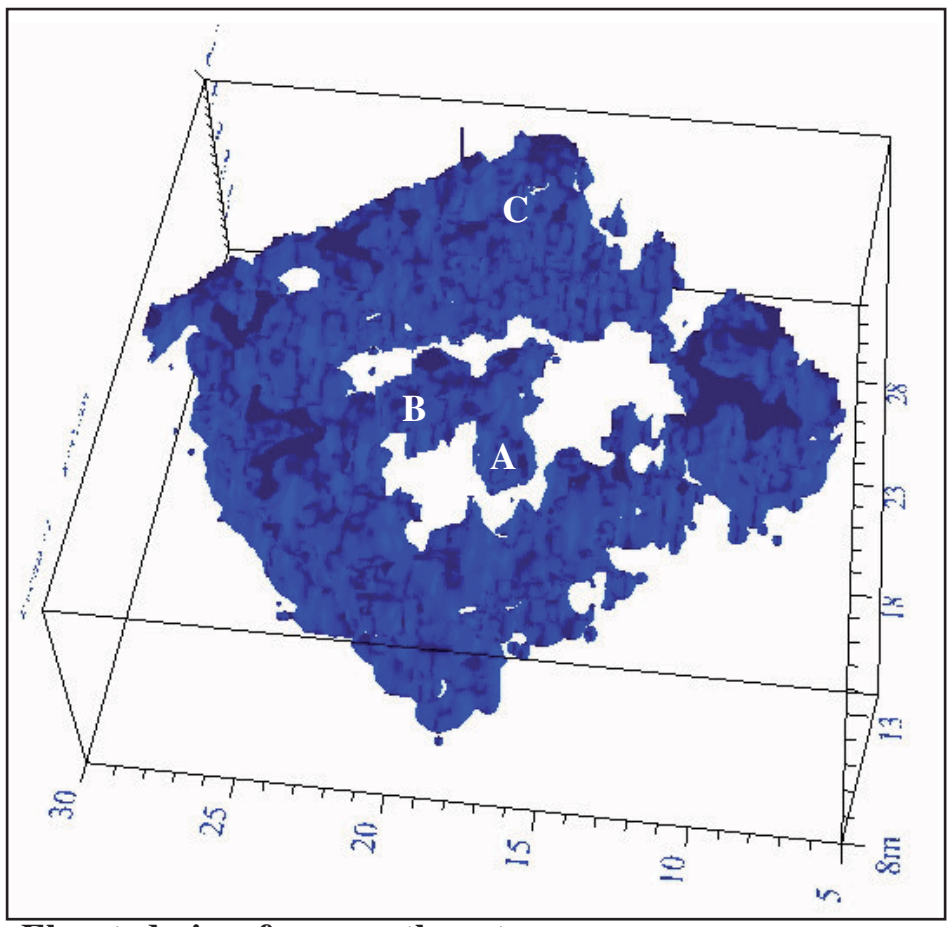


GSB Prospection Ltd.
2008/26 Radcot
GPR Data - Castle Detail
Figure 9

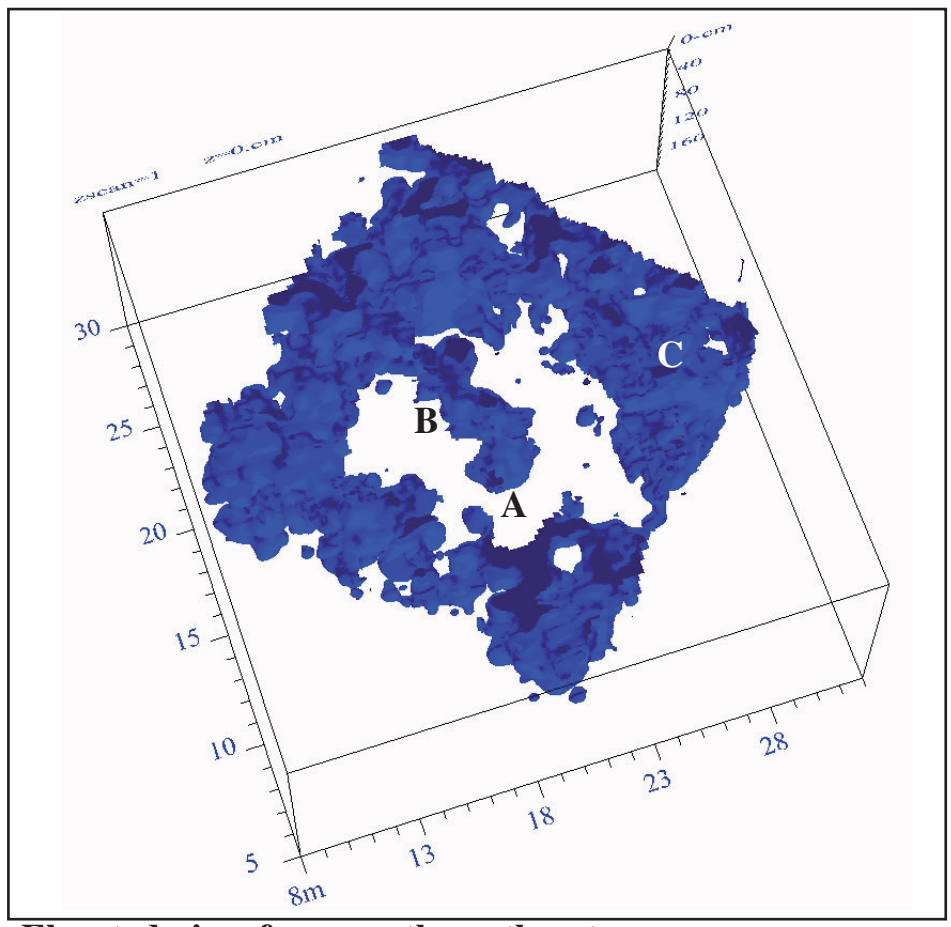




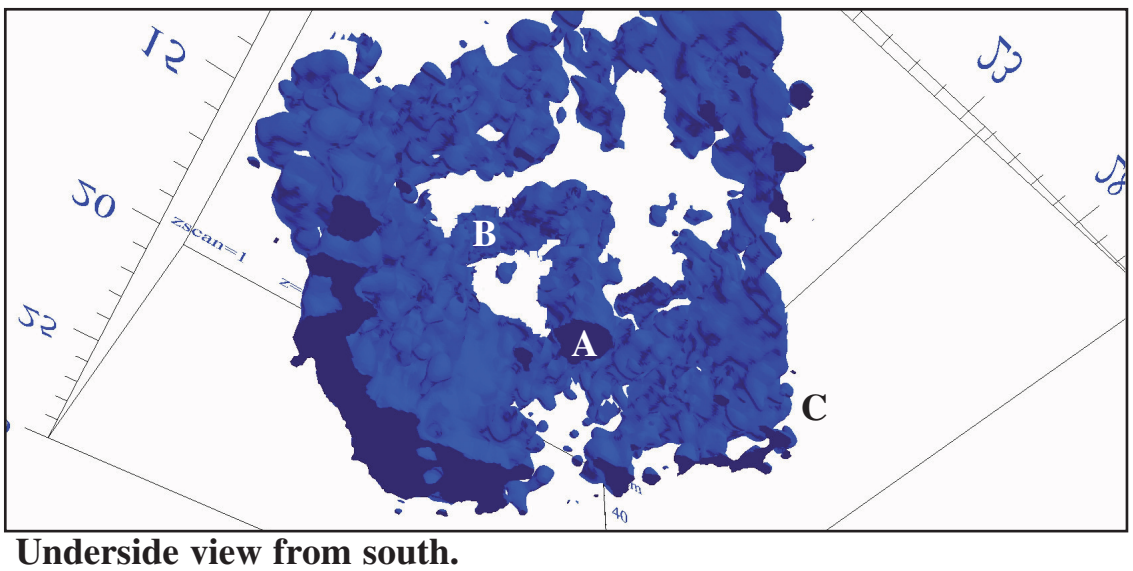
GSB Prospection Ltd.
2008/26 Radcot
GPR Data - Castle Detail (cont.)
Figure 10



Elevated view from southwest.



Elevated view from south-southeast.



Underside view from south.

Excavation results from northeast corner into centre of keep

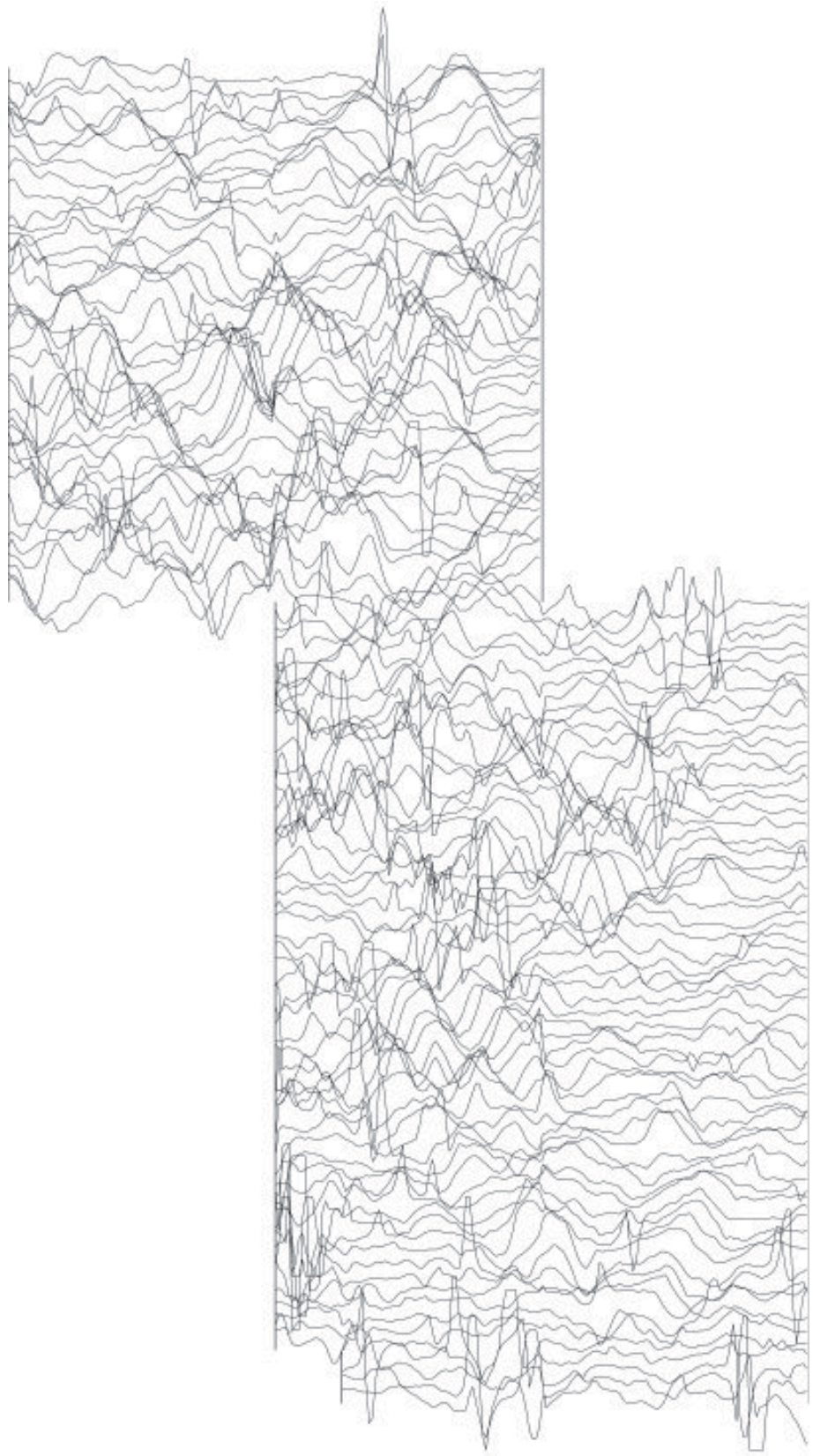
A - Central Pier

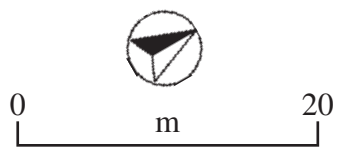
B - Central Division

C - Northeast Corner

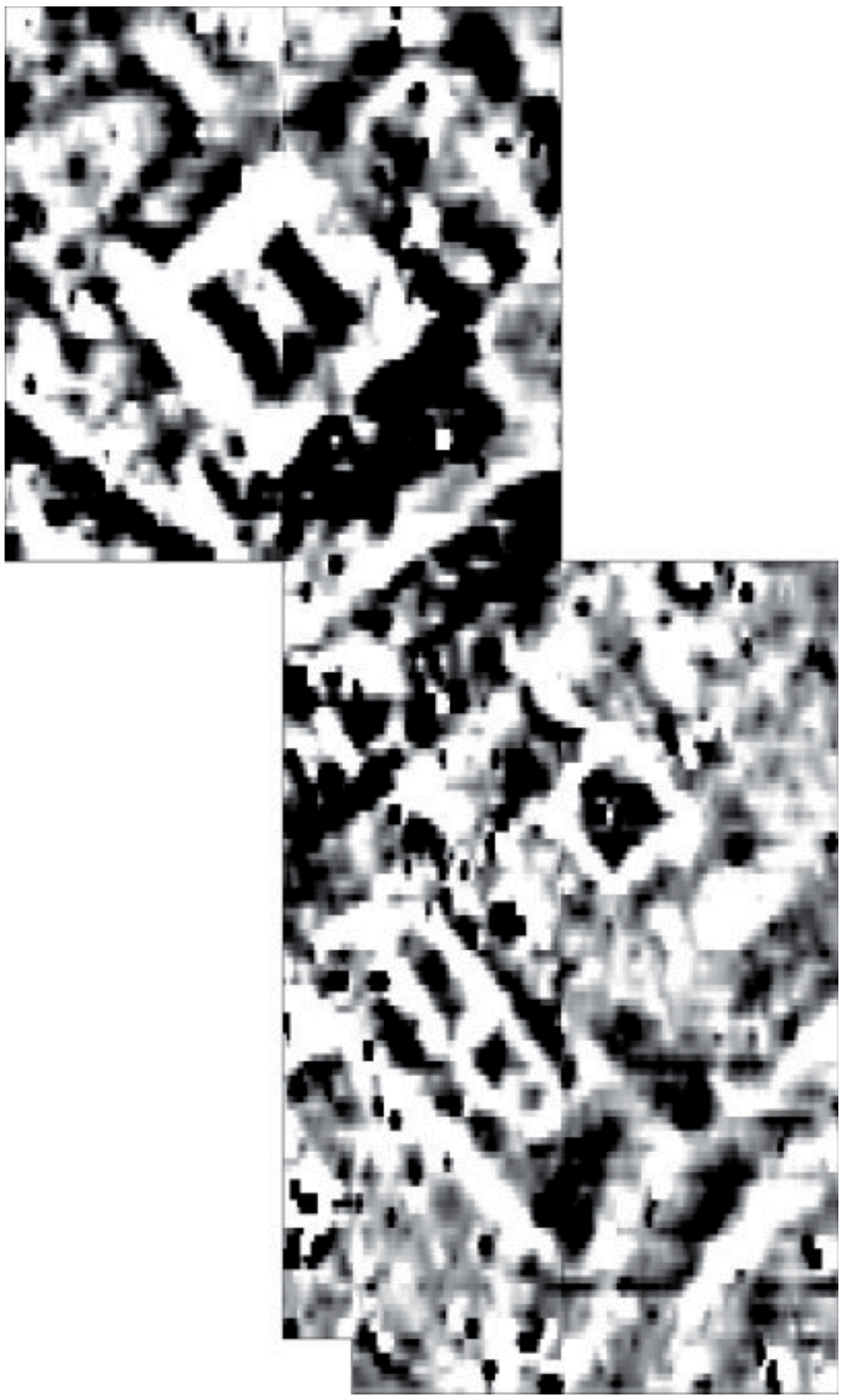
See Archive CD for Animated Models

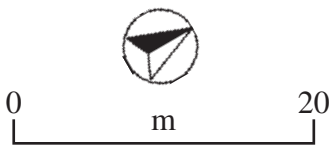
GSB Prospection Ltd.
2008/26 Radcot
GPR Data - Castle Deatail: 3D Volumetric Plots
Figure 11



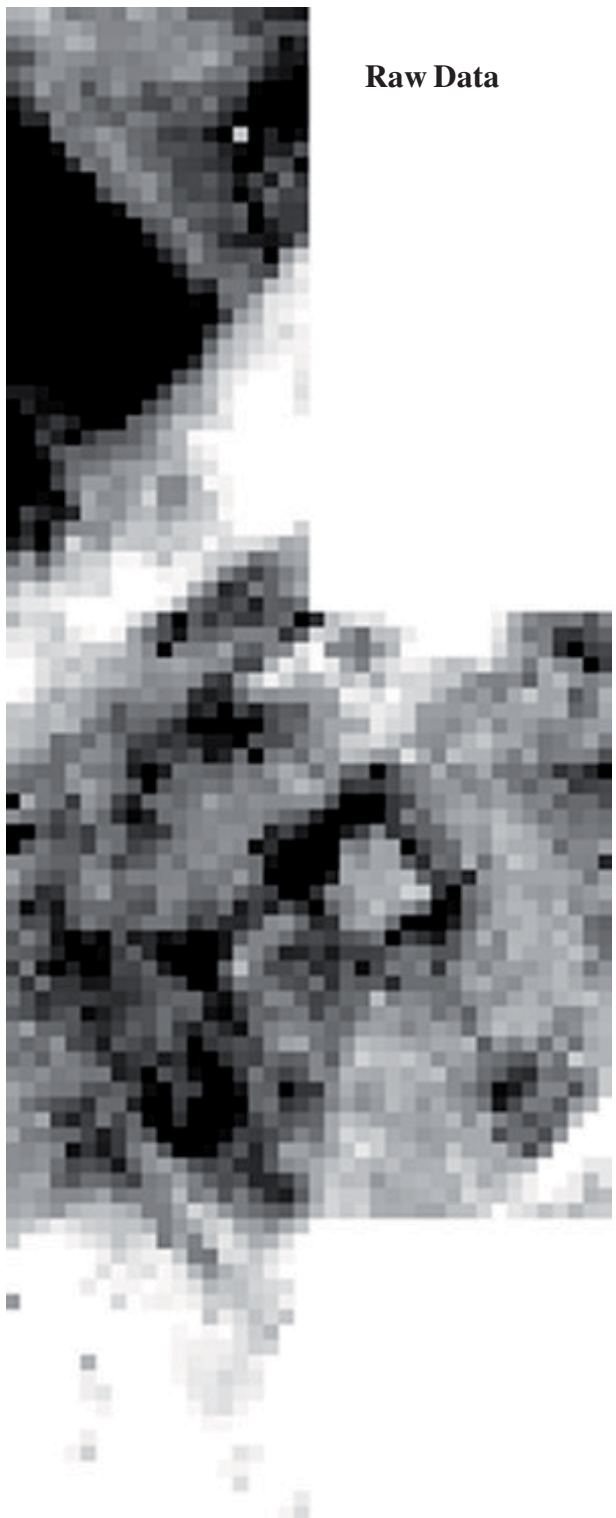


GSB Prospection Ltd.
2008/26 Radcot
Magnetic (Bartington) Data
Figure A1





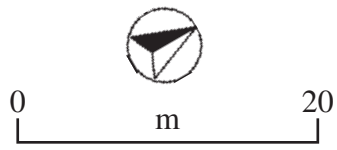
GSB Prospection Ltd.
2008/26 Radcot
Magnetic (Bartington) Data
Figure A2



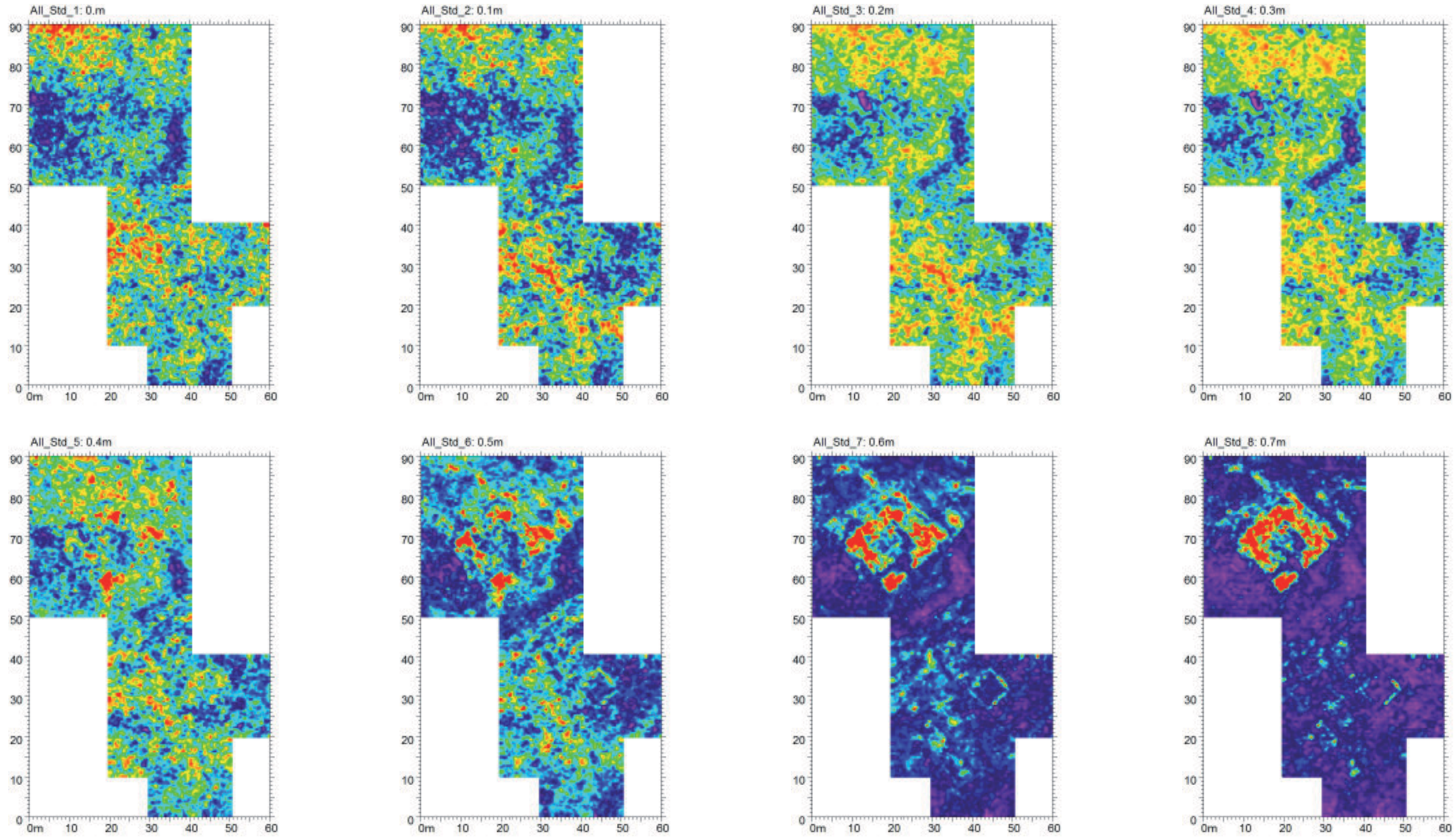
Raw Data

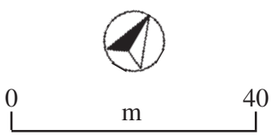
High Pass Filtered Data

Interpolated Data

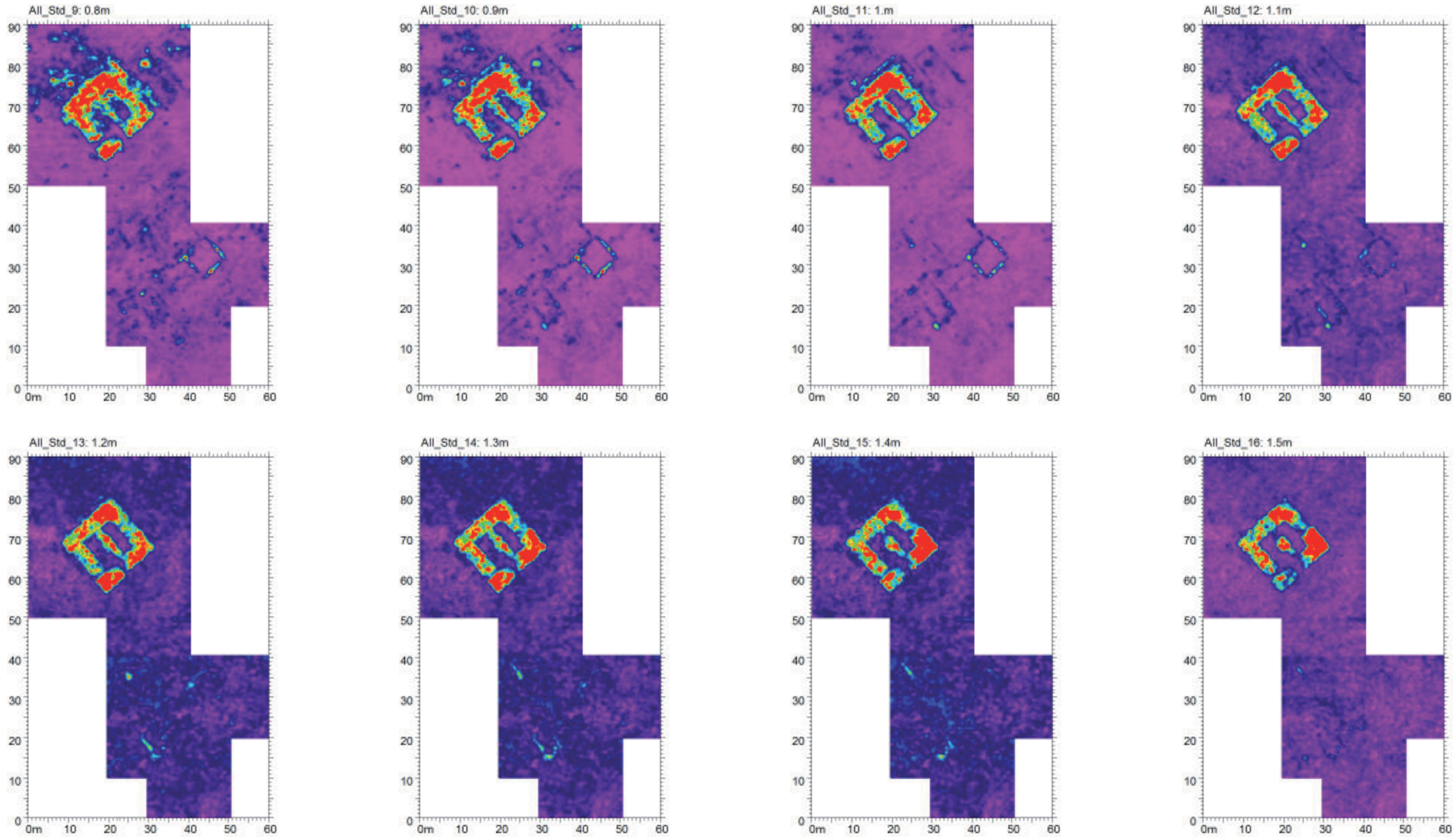


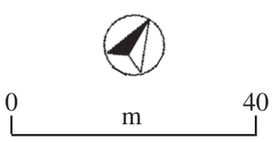
GSB Prospection Ltd.
2008/26 Radcot
Resistance Data
Figure A3



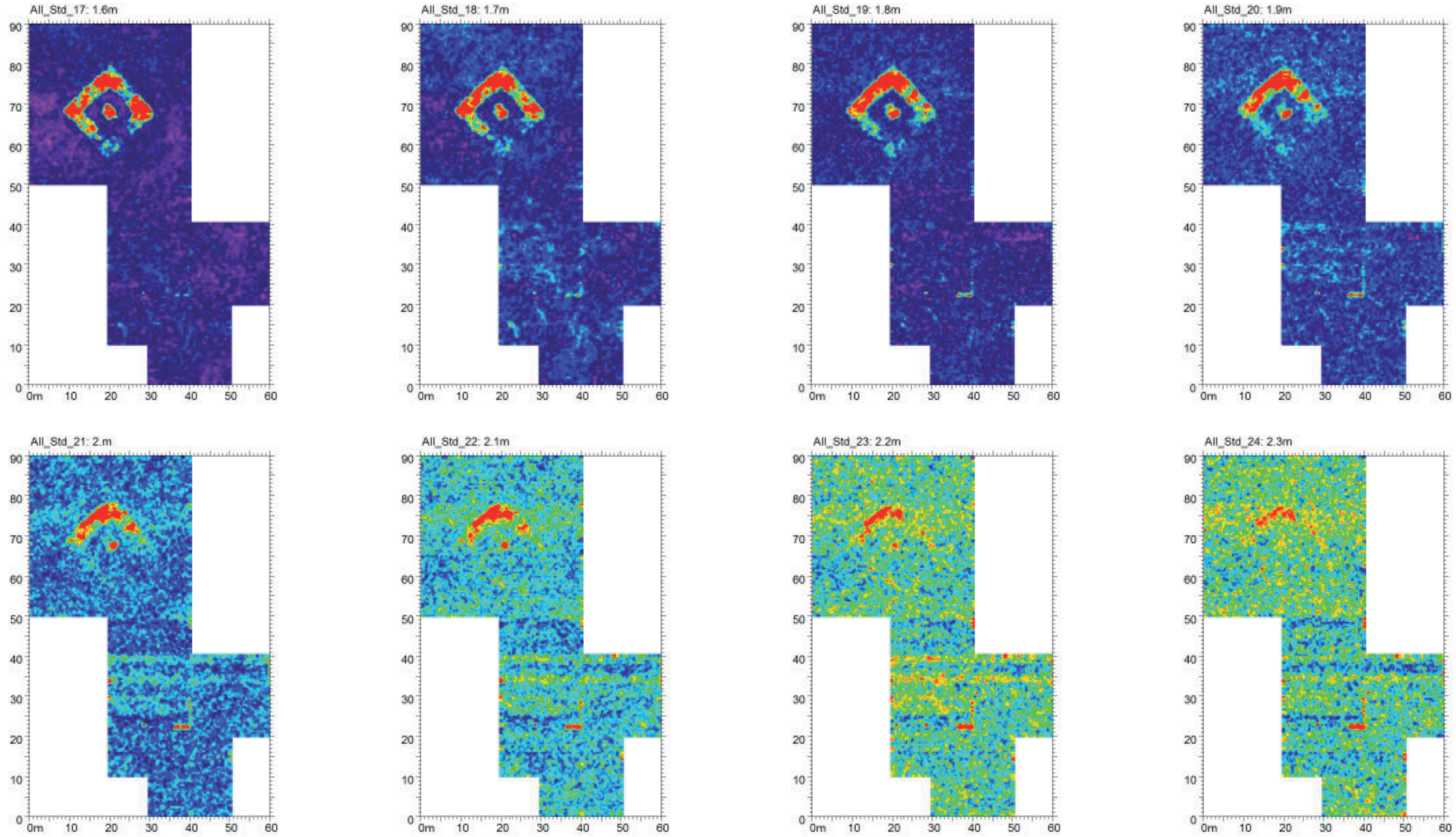


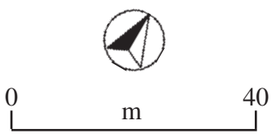
GSB Prospection Ltd.
2008/26 Radcot
GPR Time-slices
Figure A4





GSB Prospection Ltd.
2008/26 Radcot
GPR Time-slices
Figure A5





GSB Prospection Ltd.
2008/26 Radcot
GPR Time-slices
Figure A6