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KEEP YARD, DOVER CASTLE, KENT
REPORT ON GEOPHYSICAL SURVEY, JUNE 2008

Neil Linford and Louise Martin

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SUMMARY

A geophysical survey was conducted within the Keep Yard, Dover Castle, Kent to determine whether any evidence for former buildings remains or drainage features associated with the medieval castle could be revealed. Magnetic, earth resistance and ground penetrating radar (GPR) surveys were used, although every technique was in part hampered by the physical restrictions of the site. Linear anomalies possibly associated with historic drainage features and former building remains were revealed by the earth resistance survey and these were, partially, corroborated by the GPR data. Comparison with historic mapping data suggests some of the anomalies are comparatively recent and more significant remains may well, perhaps, have been obscured to geophysical techniques through the subsequent levelling of the site.

CONTRIBUTORS

The field work and reporting was conducted by Neil Linford and Louise Martin.

ACKNOWLEDGEMENTS

The cover photograph shows the gpr survey operating in front of the Keep during the survey. The authors wish to express their gratitude to all the staff at Dover Castle for their patience and assistance during the geophysical survey. In particular, we wish to thank all those who shared their considerable knowledge of the architectural history of the castle which proved invaluable during the subsequent interpretation of the geophysical survey data.

ARCHIVE LOCATION

Fort Cumberland.

DATE OF FIELDWORK AND REPORT

The fieldwork was conducted between the 2nd June 2008 and 5th June 2008 and the report was completed on 4th September 2008.

CONTACT DETAILS

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INTRODUCTION

Dover Castle (SAM 30281) is an important complex of monuments in the care of English Heritage situated on a chalk promontory overlooking both the River Dour and the modern town of Dover, which lies immediately to the west. The monument includes a medieval royal castle built within the presumed defences of a univallate Iron Age hillfort, a Roman lighthouse, and a Saxon settlement and church. The monument also includes a series of tunnels beneath the castle built between the C13th and C20th and a C16th gun battery called Moat's Bulwark at the base of the cliff.

Given its prominence and popularity with visitors the site has been chosen by Properties Presentation Department for a major programme to upgrade its interpretation and presentation during 2008-9, with the primary focus being on the medieval elements of the castle. As part of this work a geophysical survey of the inner bailey, or Keep Yard, was requested to address a number of research questions posed to inform a revised interpretation of the site (Pattison 2008). The aim of the survey is to refine and confirm what is known about the layout of drains and wall footings of previous structures, and to inform exploratory small-scale excavations planned for autumn 2008 (Linford 2008).

The castle is centred on top of a prominent hill at NGR 632475, 141944 and sits on a cap of Clay-with-flints overlying the Upper Cretaceous Chalk of Dover's famous white cliffs (Geological Survey of Great Britain 1966). There is a considerable degree of made ground within the Keep Yard itself, perhaps up to 2m deep in places and variable surface conditions including paved areas, cobbled paths and some open areas of short-mown grass. Weather conditions during the survey were mixed, although generally sunny and dry.

METHOD

A survey grid was first established over the site using a Trimble kinematic differential global positioning system (GPS).

Magnetic survey

A Bartington *Grad601* fluxgate gradiometer was used to conduct a magnetic survey over all of the accessible areas shown on Figure 1, following the standard method outlined in note 2 of Annex 1. Whilst a magnetic survey would not be expected to detect the likely archaeological remains at this site, the technique can provide useful information regarding the location of modern, ferrous services to assist with the interpretation of the other geophysical data sets.

A plot of the magnetic data superimposed over the Ordnance Survey (OS) base map is shown on Figure 2 and as an X-Y traceplot and linear greyscale image on Figure 5. Minimal post-acquisition processing was applied to the data, including the setting of each traverse to a zero-median to correct for directional sensitivity and instrument drift. To improve the visual clarity of the traceplot presented in Figure 5(A), extreme values have been truncated to a range of ±200nT/m.

Earth resistance survey

The earth resistance data was collected with a Geoscan RM15 resistance meter, MPX15 multiplexer and a PA5 electrode frame in the Twin-Electrode configuration to simultaneously collect readings at a mobile probe spacing of both 0.5m (shallow) and 1.0m (deeper penetrating), following the standard method outlined in note 1 of Annex 1. Readings were collected at 1.0m intervals along parallel survey lines separated by 0.5m for the 0.5m mobile probe spacing and separated by 1.0m for the 1.0m mobile probe spacing.

Isolated high readings, caused by poor electrode contact, have been removed from both data-sets through the application of a 2m x 2m thresholding median filter (Scollar *et al.* 1990, pp492). In addition, a Gaussian high-pass filter has been applied to enhance any linear anomalies present, with a radius of 3m for the 0.5m mobile probe spacing data-set and a radius of 5m for the 1.0m data-set. A greyscale plot of the high-pass filtered 0.5m data is superimposed over the base OS map at a scale of 1:750 in Figure 3. Plots of the raw and high-pass filtered data-sets are presented as equal area greyscale plots, at a scale of 1:750 in Figures 6 and 7 for the 0.5m and 1.0m mobile probe spacing data respectively.

Ground Penetrating Radar (GPR) survey

The GPR survey was partially constrained by the necessity to work out of the hours of visitor access to the site and was therefore targeted on the two areas of the site indicated on Figure 1. A 3d-Radar Geoscope system was used to conduct the survey collecting data from a B1831 vehicle towed, air launched antenna. Data were acquired at a 0.055m x 0.1m sample interval across a continuous wave stepped frequency range from 100 to 2000MHz in 2MHz increments and a dwell time of 2ms.

Post acquisition processing involved conversion of the raw data to time-domain profiles (through a time window of 0 to 50ns), adjustment of time-zero to coincide with the true ground surface, background and noise removal, and the application of a suitable gain function to enhance late arrivals. Representative profiles from the GPR survey are shown on Figure 8. To aid visualisation amplitude time slices were created from the entire data set, after applying a 2D-migration algorithm, by averaging data within successive 1.2ns (two-way travel time) windows (e.g. Linford 2004). An average sub-surface velocity of 0.08m/ns was assumed following constant velocity tests on the data, and was used for both the 1D migration velocity field and the time to estimated depth conversion. Each of the resulting time slices, shown as individual greyscale images in Figures 9 and 10, therefore represents the variation of reflection strength through successive ~0.05m intervals from the ground surface.

RESULTS

A simplified graphical summary of the anomalies discussed in the following text, superimposed on the base Ordnance Survey map data, is provided in Figure 11. Specific anomalies from the earth resistance [r], magnetic [m] and ground penetrating radar [gpr] data-sets are indicated both in the text and as annotation to Figure 11.

General response and modern interference

As expected, a considerable degree of ferrous disturbance from the standing buildings and services within the Keep Yard was detected by the geophysical survey, particularly within the magnetic data. The surface conditions also varied across the site, limiting the application of the earth resistance technique to the grassed areas, but also influencing the GPR response where the antenna crossed over raised curbing and iron-work. It is also likely that a degree of made ground has been introduced to level the site, perhaps extending to a depth of 2m in the area adjacent to Arthur's Hall based on the original entry level visible within this building.

Significant anomalies

Magnetic survey

The results from the magnetic survey have been severely compromised by the presence of ferrous metal in close proximity to the standing buildings in the Keep Yard, and from the network of modern services. This has reduced the usefulness of this data-set due, in part, to the density of magnetic disturbance encountered at the site.

Despite this level of interference two tentative linear anomalies, [m1] and [m2], are apparent under the grassed areas to the NW of the Keep, possibly the course of an historic drain or more recent non-ferrous service. Three other anomalies, [m3], [m4] and [m5] are also discernible mainly under paved and cobbled areas of the site, and seem unlikely to be of significance.

Earth resistance survey

This technique has proved more suitable to conditions at the site, although coverage was obviously limited to the areas of open grass where contact between the electrodes and the ground surface could be made. This has led to a rather key-hole survey, over the accessible areas surrounding the Keep, and some difficulty in establishing a common background resistance value to compare with more significant responses.

For example, the narrow strip of grass immediately NW of the Keep appears to be dominated by a relatively low background resistance (Figure 6(A)) containing a weak, linear high resistance response [r1]. This anomaly is better resolved after the application of a high-pass filter (Figure 6(B)), which may suggest the presence of a parallel low resistance anomaly [r2] extending slightly further to the N than [r1]. Both anomalies are more diffuse in the deeper penetrating, 1.0m mobile probe spacing data suggesting they are related to a near-surface causative feature, perhaps a stone lined drain and associated ditch giving rise to the corresponding magnetic response [m1].

Further evidence for the possible course of drains or other services is found at [r3] where a linear high resistance anomaly heading from the King's Gate appears to cross the path and converge with [r1] and [r2] in the vicinity of a more complex response [r4]. Anomaly [r3] is equally well resolved in both the 0.5m and 1.0m mobile probe spacing data sets, suggesting a deeper lying feature, although surface levels vary quite rapidly in this area, possibly indicating differing depths of overlying made ground. It is also of interest to note that the historic mapping of the castle indicates a short linear feature apparently corroborating the location of [r3] (OS Historic Mapping County Series: Kent 1865, 1:2500). This may suggest that [r3] was originally related to a feature with some above ground expression, such as a length of wall, although it is unclear why this should have been recorded by the historic mapping when other elements of the castle appear to have been deliberately removed for strategic reasons. It is also possible that the feature shown on the historic mapping is an artefact from the digitisation of the original hard copy.

Two low resistance linear anomalies [r5] and [r6] also run to the N of [r3] towards a group of modern service manhole covers, partially represented by the response at [r7]. The absence of a parallel high resistance anomaly suggests [r5] and [r6] are more likely to represent ditches or a service trench rather than a stone lined drain. However, [r6] does cut through an area of ill-defined high resistance response containing some rectilinear elements [r8] that may be associated with a former building sited here against the curtain wall.

A pair of parallel, more diffuse linear anomalies [r9] are found to the S of the King's Gate, but ground conditions in this area only allowed for limited earth resistance coverage that hampers a more definite interpretation. However, the high-pass filtered version of the 0.5m mobile probe spacing data (Figure 6(B)) does reveal a short, right angled anomaly [r10] that correlates with the location of a former building against the curtain wall shown on the historic mapping. It is difficult to ascertain the significance of this building as it only appears on the later 1937 mapping, together with a smaller building against the curtain wall immediately to the N (Figure 11(A)). This suggests, perhaps, that both buildings were relatively short lived late C19th to early C20th structures that have subsequently been removed.

The high-pass filtered version of the earth resistance data also reveals a network of linear, low resistance anomalies [r11] to the W of the Keep. These appear to head S towards the known location of a large, water cistern beneath the flagstones beyond the grassed area available to the earth resistance survey. The relationship between [r11] and the Keep itself is difficult to fully ascertain, but it is possible that this represents a conduit collecting rain water from the roof for storage in the water cistern. In addition, [r11] passes close to a discrete, ~2.7m square feature shown on the 1937 historic mapping immediately N of the Keep (corresponding to the location of [gpr10] on Figure 11) that may be associated with the putative drainage network.

Finally, there is an area of apparent low resistance response [r12] to the S of the Keep where Inigo Jones was commissioned, in haste, to remodel a new entrance for the visit of Henrietta Maria of France, following her betrothal to Prince Charles in 1624 (Coad 1995, p55). However, these anomalies are not sufficiently well defined to determine their full significance and this rapidly conducted refurbishment may not, necessarily, be expected to leave any substantial remains identifiable as geophysical anomalies. In addition, the linear portion of this response corresponds with a high magnitude magnetic anomaly, suggesting a more recent service trench.

Ground Penetrating Radar survey

The GPR survey has responded to both the change in levels and nature of the surfaces encountered over the site. For example, the flagstone path separating the two grassed areas encompassed by the GPR survey in Area A has produced a complex anomaly, with little discernible detail, from the surface to at least 20ns (~0.8m). Survey over the grassed areas appears to have been more successful, although it is unclear how much the local geology and nature of the made ground has influenced the results using this technique.

The course of the tentative drain revealed by [r1], [r2] and [m1] is replicated by a linear low amplitude anomaly [gpr1] evident between 14.4 and 21.6ns (~0.6 to 0.9m). Some caution must be expressed in the interpretation of [gpr1] as the anomaly runs parallel to the orientation of the instrument traverses, although there is some evidence for an additional linear spur heading across the path to the E.

The linear anomaly at [r3] is also partially replicated in the GPR data [gpr2] between 14.4 and 18ns (~0.6 to 0.75m), although with reduced clarity when compared to the resistance data. This may suggest either less favourable site conditions for the GPR or, perhaps, evidence for a less substantial causative feature. A low amplitude reflection [gpr3] is also found immediately to the N that corroborates [r5] together with a high amplitude reflector, [gpr4], in the vicinity of the observed manhole covers and the high resistance response [r7]. The group of high resistance anomalies at [r8] are not completely covered within the GPR survey grid, although it is possible that there is some correspondence between [r8] the high amplitude reflector [gpr5].

Some additional high amplitude reflectors [gpr6-8] are found in the vicinity of the Keep and at least one of these directly replicates part of the complex high resistance anomaly [r4]. The significance of the near surface response at [gpr9] is difficult to fully assess and whilst this may, possibly, represent a fragment of wall, its relatively shallow extent between 6 and 12ns (~0.25 to 0.5m) questions the validity of this interpretation.

Results from the GPR survey of Area B seem to be more disturbed with few coherent reflections evident through successive time slices (Figure 10). A central group of high amplitude responses [gpr10] appears to correlate with the location of the feature noted above from the 1937 historic mapping above, and apparently extends from 4 to 36ns (0.15 to 1.5m). This latter anomaly is fragmented and may represent some degree of near-surface ringing exacerbated by the air-launched antenna, although no topographic irregularity was noted on the surface during the survey. Other fragmented high amplitude anomalies [gpr11] are found to the SE of this survey area, but do not suggest a sufficiently coherent pattern for further interpretation or correlation with the low resistance anomaly [r11].

CONCLUSION

Results from the survey have been constrained by site conditions including limitations to the physical access for the earth resistance technique (grassed areas), the need to maintain visitor safety and access, and the ground conditions present. In addition, the continual occupation and reworking of the buildings within the Keep has almost certainly led to increased levels of deliberately made-up and relevelled ground. Despite the key-hole nature of the earth resistance survey this technique has, perhaps, provided the most useful information revealing a number of linear and recti-linear anomalies apparently related to drainage or service conduits and fragments of former buildings, identified from the historic mapping. Unfortunately, the full significance of these anomalies is difficult to assess, as they are often rather isolated and incomplete where more recent hard surfacing has restricted the availability of open grassed areas for earth resistance survey.

It was hoped that the GPR survey might corroborate and extend the definition of any anomalies identified in the earth resistance survey beneath areas of hard surfacing, and indicate the depth from the surface to the likely causative features. In this regard, the trial GPR survey has provided only a partial correlation with the earth resistance anomalies and limited additional information. This may be due to a combination of factors including the nature of the geology, made ground and surface conditions influencing the suitability of the GPR system at the site. With respect to the proposed excavation trench in the vicinity of N tower of the Keep (T. Cromwell *pers. comm.*), the geophysical survey has revealed a number of linear anomalies, possibly related to drainage features, and some areas of more fragmented responses that may, tentatively, be ascribed to building rubble. However, the geophysical data is not sufficiently clear to indicate the definitive presence of *in situ* building remains in this area.

LIST OF ENCLOSED FIGURES

Figure 1 Location of the geophysical surveys (1:1000).

Figure 2 Linear greytone image of magnetic data superimposed over base OS map (1:750).

Figure 3 Equal area greytone image of earth resistance data (0.5m mobile probe separation) superimposed over base OS map (1:750).

Figure 4 Linear greytone image of GPR data (10.8 to 12ns time slice) superimposed over base OS map (1:750).

Figure 5 (A) Trace plot and (B) greytone representation of the magnetic data (1:750).

Figure 6 Greytone representation of (A) the raw and (B) high-pass filtered earth resistance data collected with a 0.5m mobile probe separation (1:750).

Figure 7 Greytone representation of (A) the raw and (B) high-pass filtered earth resistance data collected with a 1.0m mobile probe separation (1:750).

Figure 8 Representative profiles from the GPR survey (see Figure 11 for the location of these profiles).

Figure 9(A) Amplitude time slices from the GPR survey in Area A between 0 and 28.8ns (1:750).

Figure 9(B) Amplitude time slices from the GPR survey in Area A between 28.8 and 47ns (1:750).

Figure 10(A) Amplitude time slices from the GPR survey in Area B between 0 and 28.8ns (1:500).

Figure 10(B) Amplitude time slices from the GPR survey in Area B between 28.8 and 47ns (1:500).

Figure 11 (A) OS historic mapping County series, Kent 1937 (1:1000) together with (B) the combined graphical interpretation of the geophysical anomalies, including the location of the representative GPR profiles shown in Figure 8 (1:750).

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ANNEX 1: NOTES ON STANDARD PROCEDURES

1) Earth Resistance Survey: Each 30 metre grid square is surveyed by making repeated parallel traverses across it, all aligned parallel to one pair of the grid square's edges, and each separated by a distance of 1 metre from the last; the first and last traverses being 0.5 metres from the nearest parallel grid square edge. Readings are taken along each traverse at 1 metre intervals, the first and last readings being 0.5 metres from the nearest grid square edge.

   Unless otherwise stated the measurements are made with a Geoscan RM15 earth resistance meter incorporating a built-in data logger, using the twin electrode configuration with a 0.5 metre mobile electrode separation. As it is usually only relative changes in earth resistance that are of interest in archaeological prospecting, no attempt is made to correct these measurements for the geometry of the twin electrode array to produce an estimate of the true apparent resistivity. Thus, the readings presented in plots will be the actual values of earth resistance recorded by the meter, measured in Ohms (Ω). Where correction to apparent resistivity has been made, for comparison with other electrical prospecting techniques, the results are quoted in the units of apparent resistivity, Ohm-m (Ωm).

   Measurements are recorded digitally by the RM15 meter and subsequently transferred to a portable laptop computer for permanent storage and preliminary processing. Additional processing is performed on return to the Centre for Archaeology using desktop workstations.

2) Magnetic Survey: Each 30 metre grid square is surveyed by making repeated parallel traverses across it, all parallel to that pair of grid square edges most closely aligned with the direction of magnetic N. Each traverse is separated by a distance of 1 metre from the last; the first and last traverses being 0.5 metre from the nearest parallel grid square edge. Readings are taken along each traverse at 0.25 metre intervals, the first and last readings being 0.125 metre from the nearest grid square edge.

   These traverses are walked in so called 'zig-zag' fashion, in which the direction of travel alternates between adjacent traverses to maximise survey speed. Where possible, the magnetometer is always kept facing in the same direction, regardless of the direction of travel, to minimise heading error. However, this may be dependent on the instrument design in use.

   Unless otherwise stated the measurements are made with either a Bartington *Grad601* or a Geoscan FM36 fluxgate gradiometer which incorporate two vertically aligned fluxgates, one situated either 1.0m or 0.5 metres above the other; the bottom fluxgate is carried at a height of approximately 0.2 metres above the ground surface. Both instruments incorporate a built-in data logger that records measurements digitally; these are subsequently transferred to a portable laptop computer for permanent storage and preliminary processing. Additional processing is performed on return to the Centre for Archaeology using desktop workstations.

It is the opinion of the manufacturer of the Geoscan instrument that two sensors placed 0.5 metres apart cannot produce a true estimate of vertical magnetic gradient unless the bottom sensor is far removed from the ground surface. Hence, when results are presented, the difference between the field intensity measured by the top and bottom sensors is quoted in units of nano-Tesla (nT) rather than in the units of magnetic gradient, nano-Tesla per metre (nT/m).

3) Resistivity Profiling: This technique measures the electrical resistivity of the subsurface in a similar manner to the standard resistivity mapping method outlined in note 1. However, instead of mapping changes in the near surface resistivity over an area, it produces a vertical section, illustrating how resistivity varies with increasing depth. This is possible because the resistivity meter becomes sensitive to more deeply buried anomalies as the separation between the measurement electrodes is increased. Hence, instead of using a single, fixed electrode separation as in resistivity mapping, readings are repeated over the same point with increasing separations to investigate the resistivity at greater depths. It should be noted that the relationship between electrode separation and depth sensitivity is complex so the vertical scale quoted for the section is only approximate. Furthermore, as depth of investigation increases the size of the smallest anomaly that can be resolved also increases.

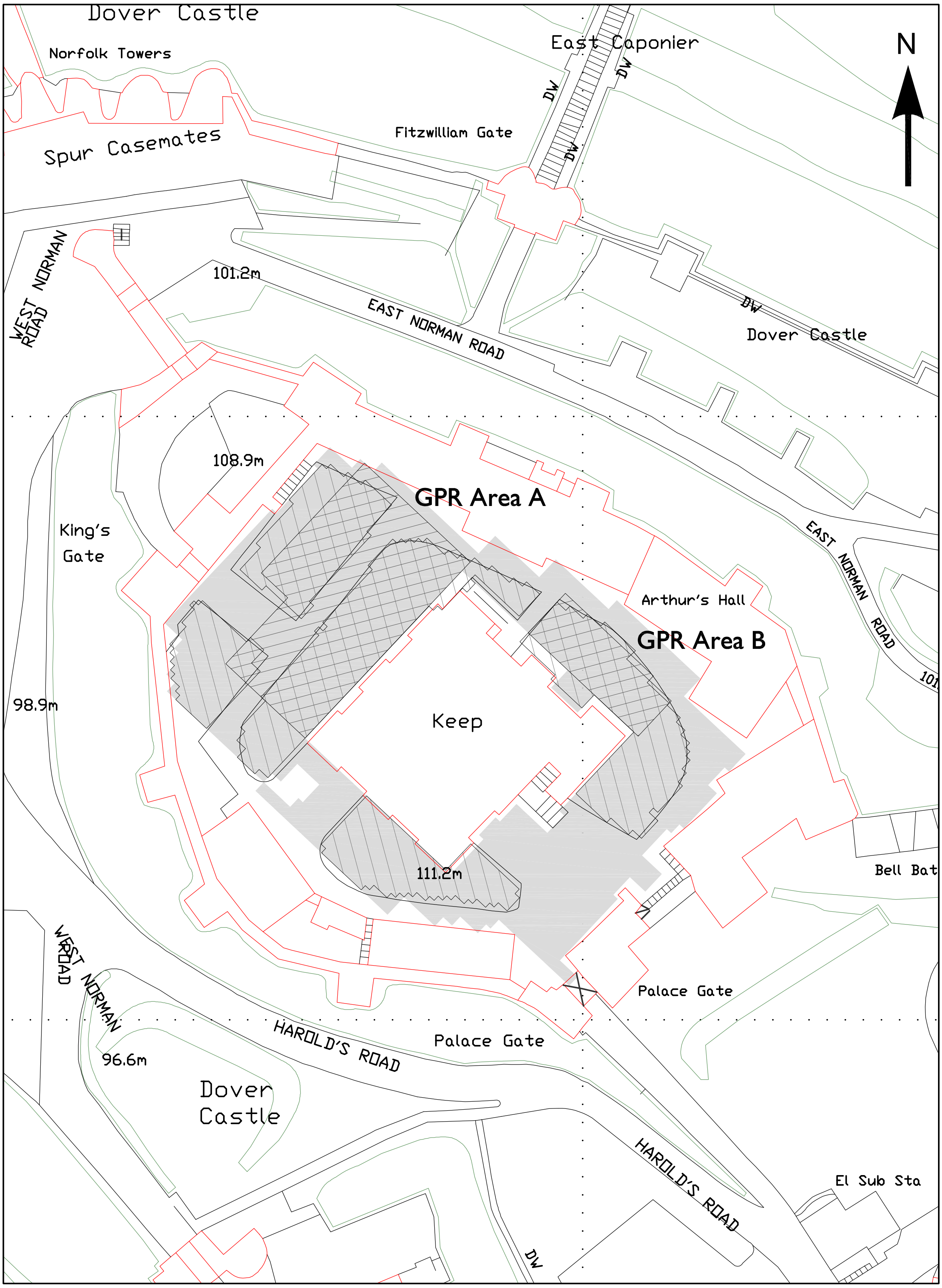
Typically a line of 25 electrodes is laid out separated by 1 or 0.5 metre intervals. The resistivity of a vertical section is measured by selecting successive four electrode subsets at increasing separations and making a resistivity measurement with each. Several different schemes may be employed to determine which electrode subsets to use, of which the Wenner and Dipole-Dipole are typical examples. A Campus Geopulse earth resistance meter, with built in multiplexer, is used to make the measurements and the Campus Imager software is used to automate reading collection and construct a resistivity section from the results.

KEEP YARD, DOVER CASTLE, KENT

Location of geophysical surveys, June 2008.

Figure 1

TR3241



0 30m

1:1000

magnetometer survey earth resistance survey GPR survey

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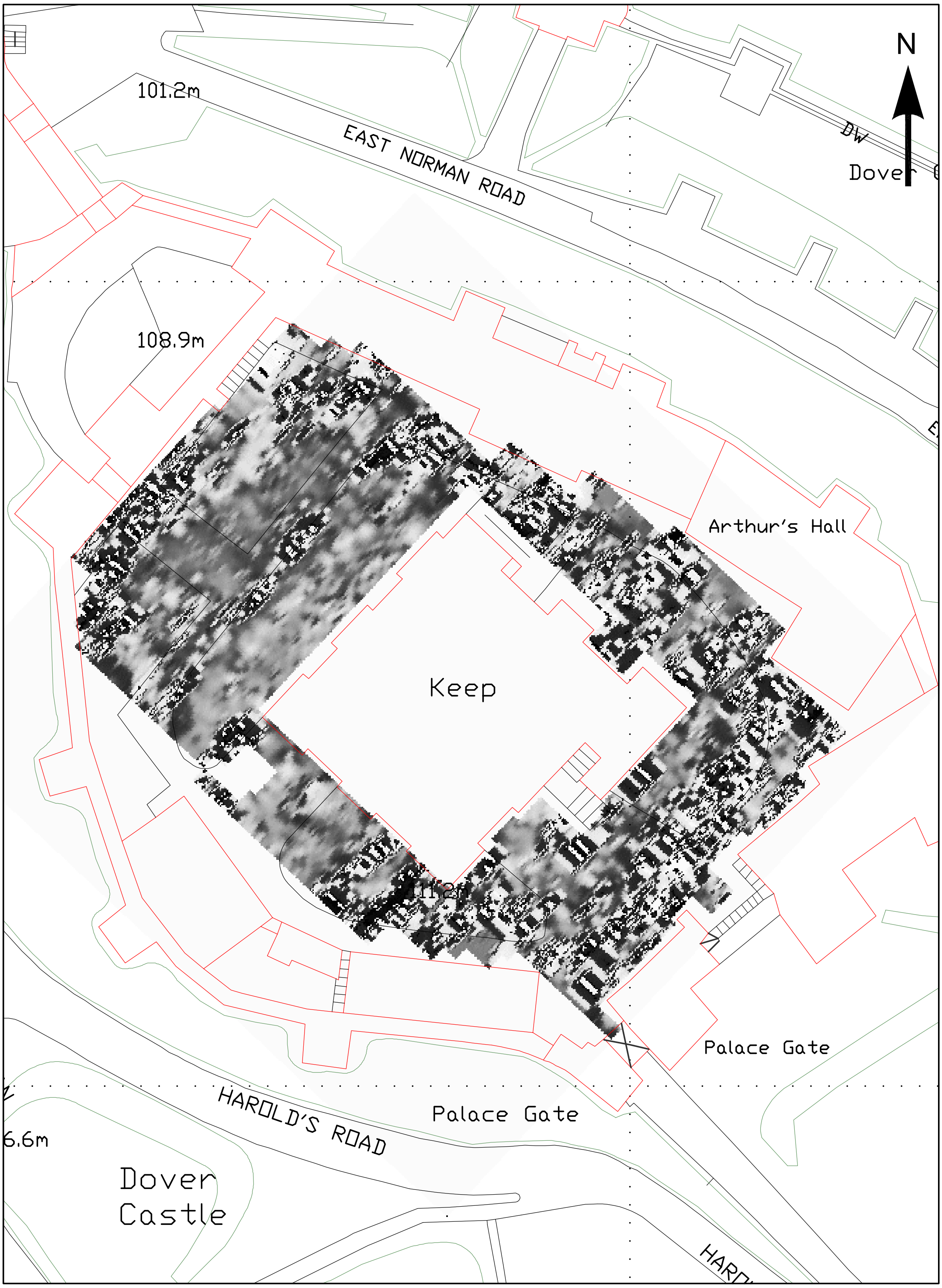
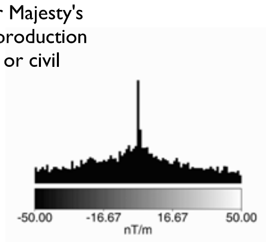
KEEP YARD, DOVER CASTLE, KENT
Magnetic survey, June 2008.

Figure 2

TR3241



325



0 30m
1:750

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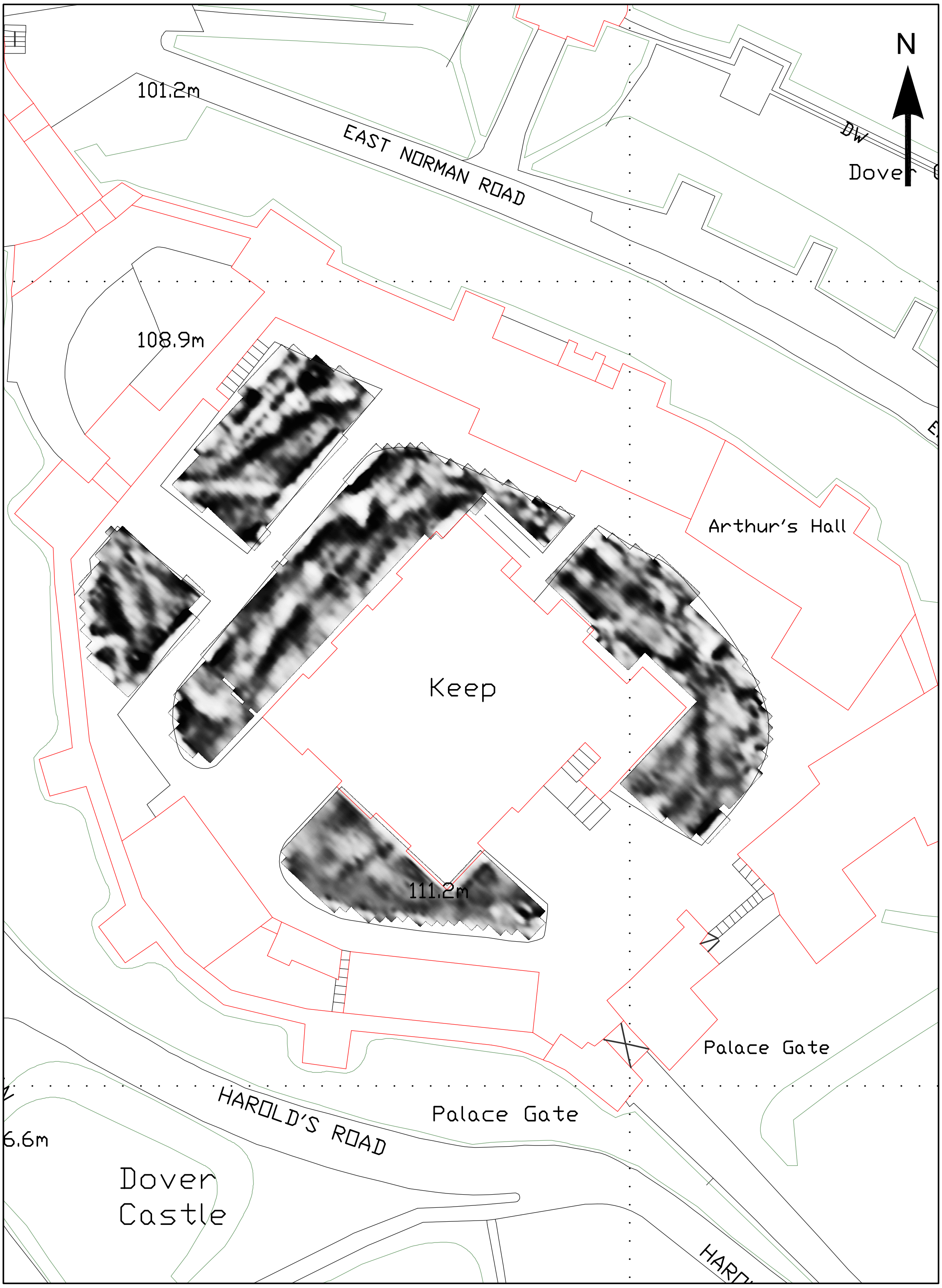
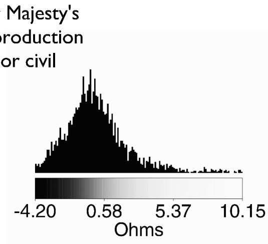
Figure 3

KEEP YARD, DOVER CASTLE, KENT

Earth resistance survey (0.5m mobile probe spacing), June 2008.

TR3241





0 30m

1:750

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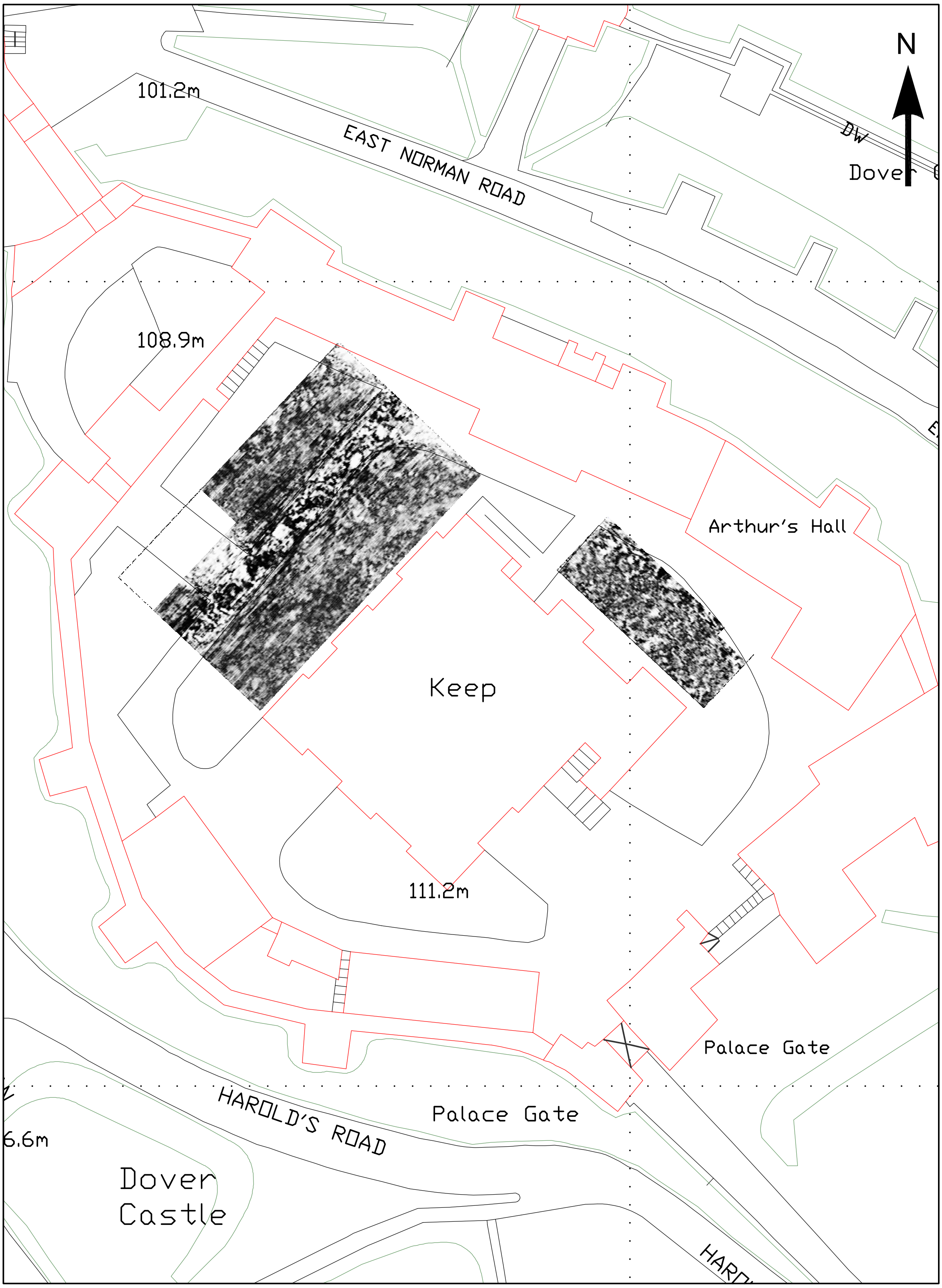
KEEP YARD, DOVER CASTLE, KENT
GPR survey (10.8 to 12ns time slice), June 2008.

Figure 4

TR3241



0 30m
1:750

Low High
relative reflector strength

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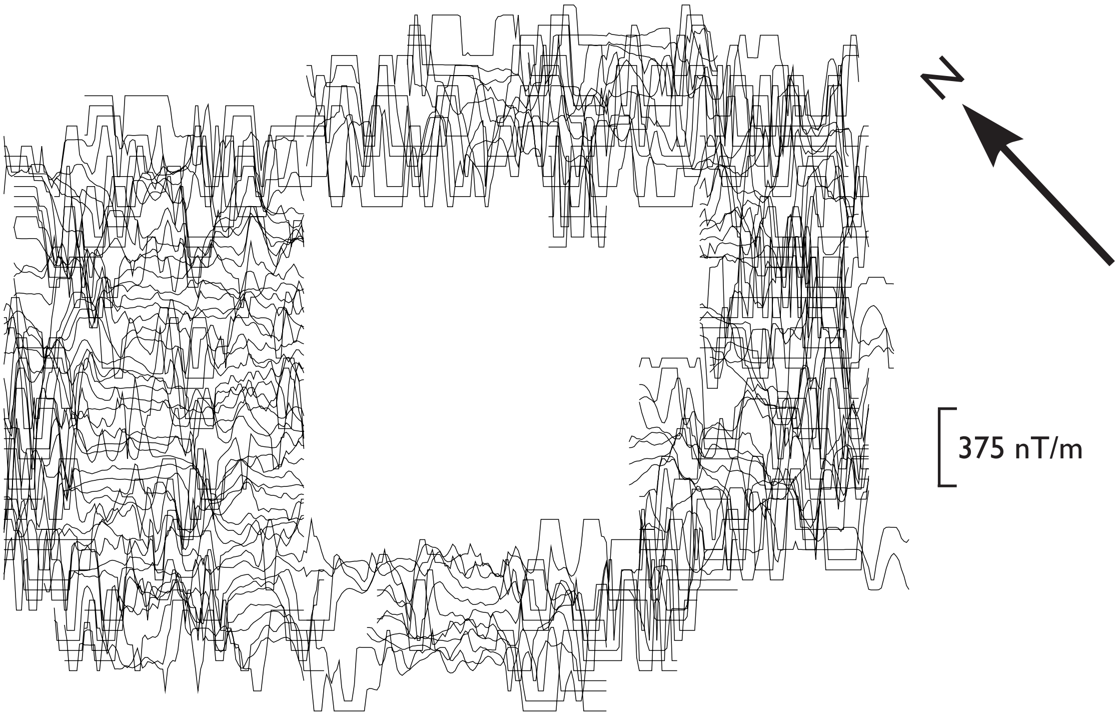
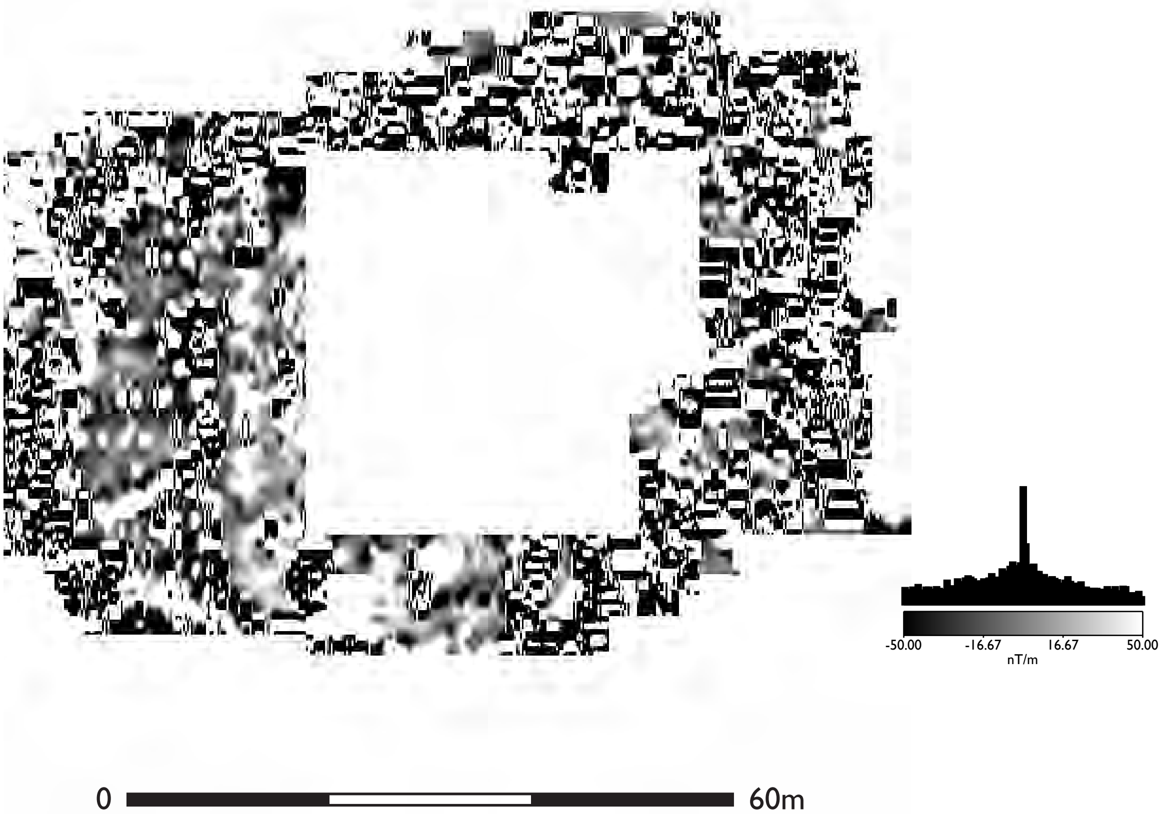
KEEP YARD, DOVER CASTLE, KENT
Magnetic survey, June 2008

Figure 5

A) Traceplot of raw data



B) Linear greyscale plot of raw data



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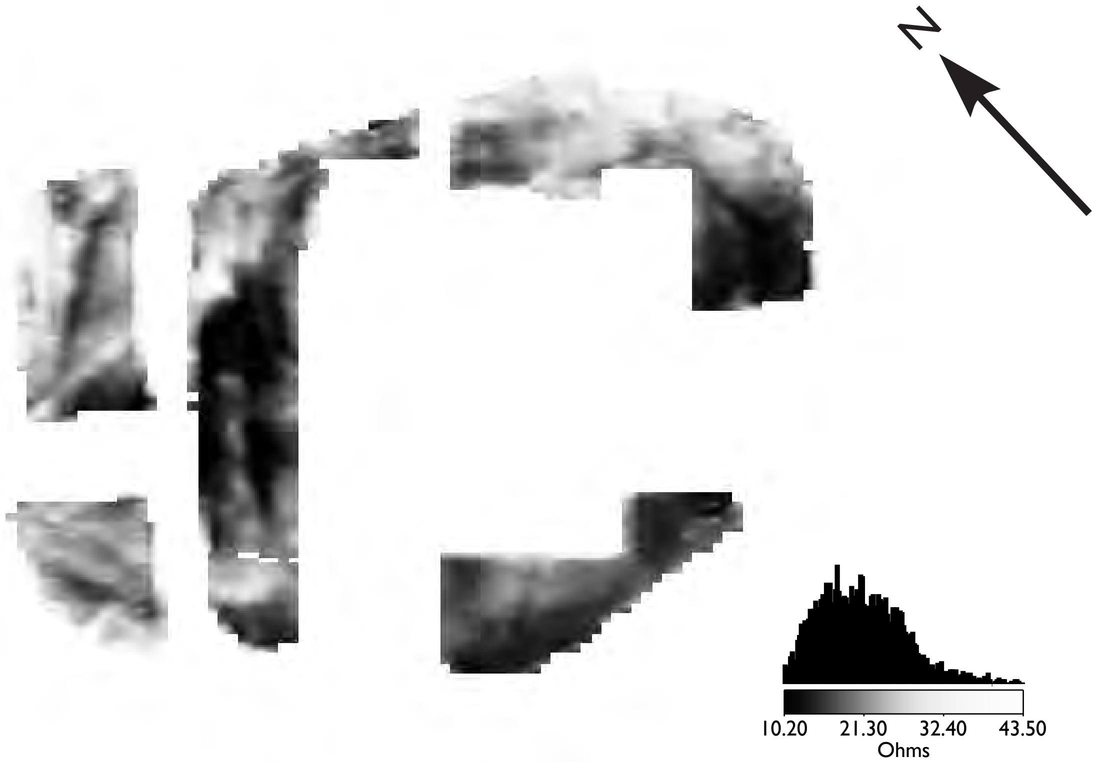
KEEP YARD, DOVER CASTLE, KENT

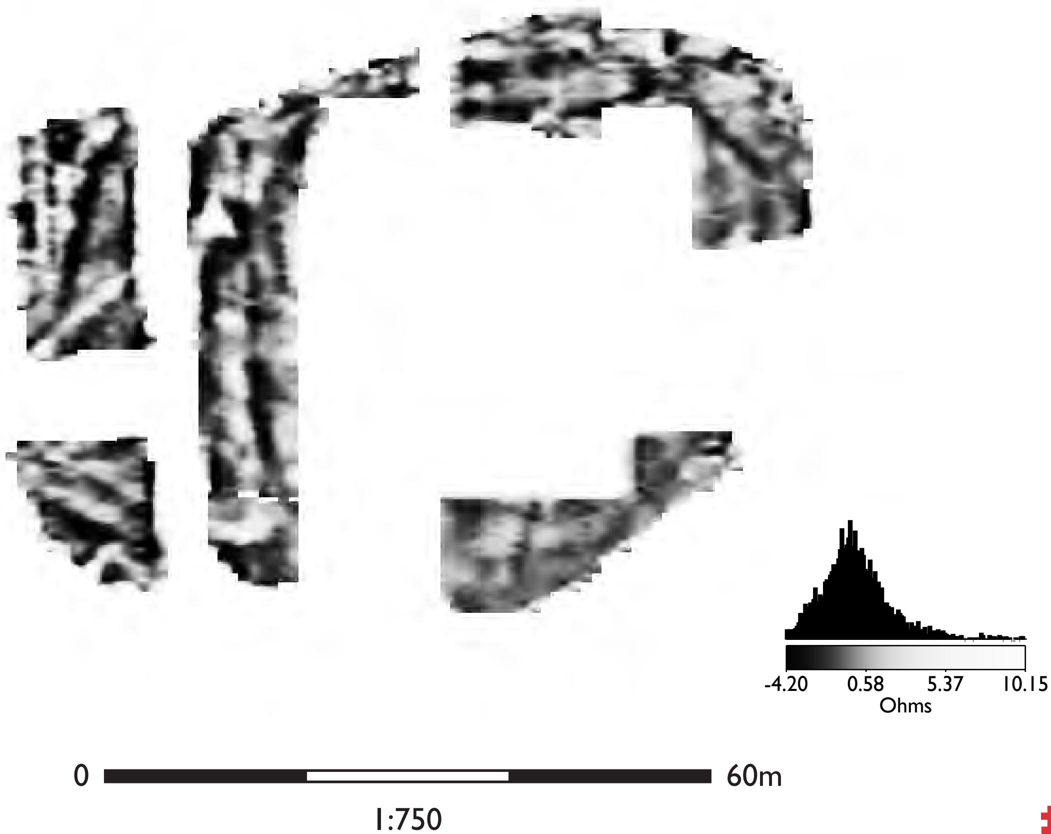
Earth resistance survey at 0.5m mobile probe spacing, June 2008

Figure 6

A) Equal area plot of raw data



B) Equal area plot of high pass filtered data



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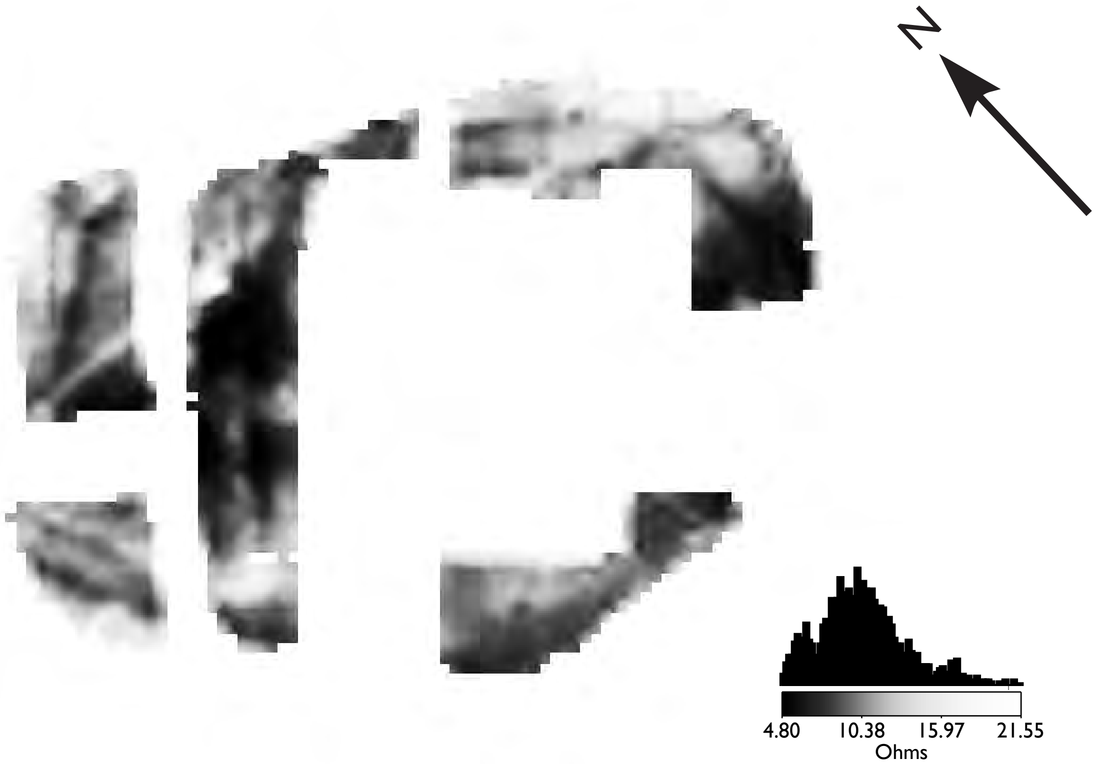
KEEP YARD, DOVER CASTLE, KENT

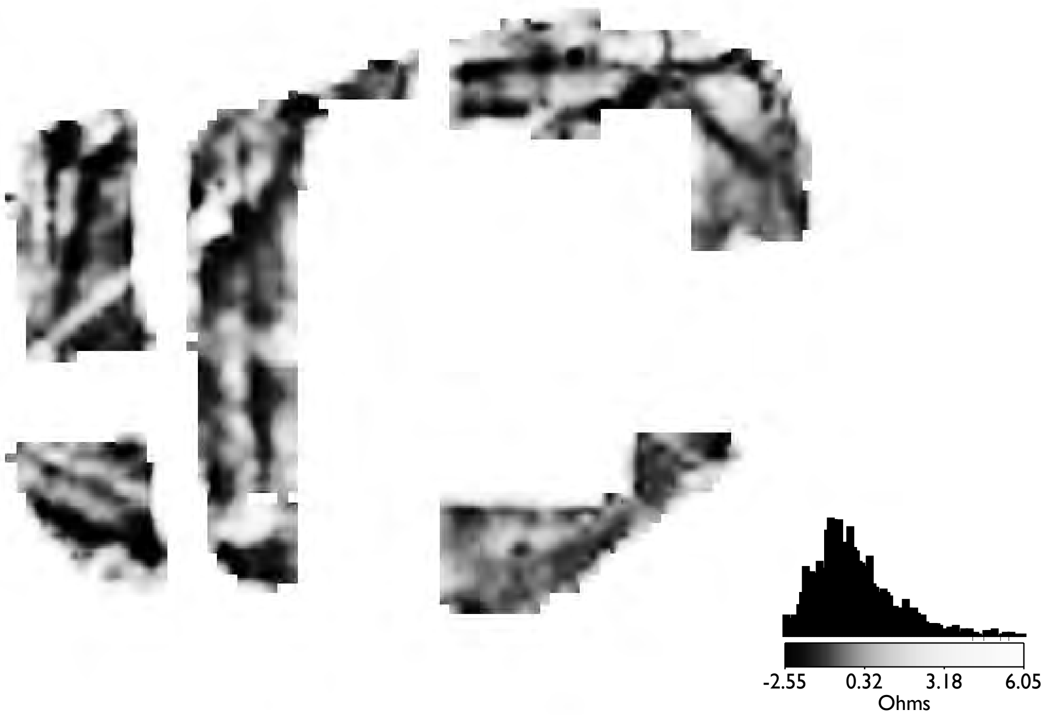
Earth resistance survey at 1.0m mobile probe spacing, June 2008

Figure 7

A) Equal area plot of raw data



B) Equal area plot of high pass filtered data



0 60m

1:750

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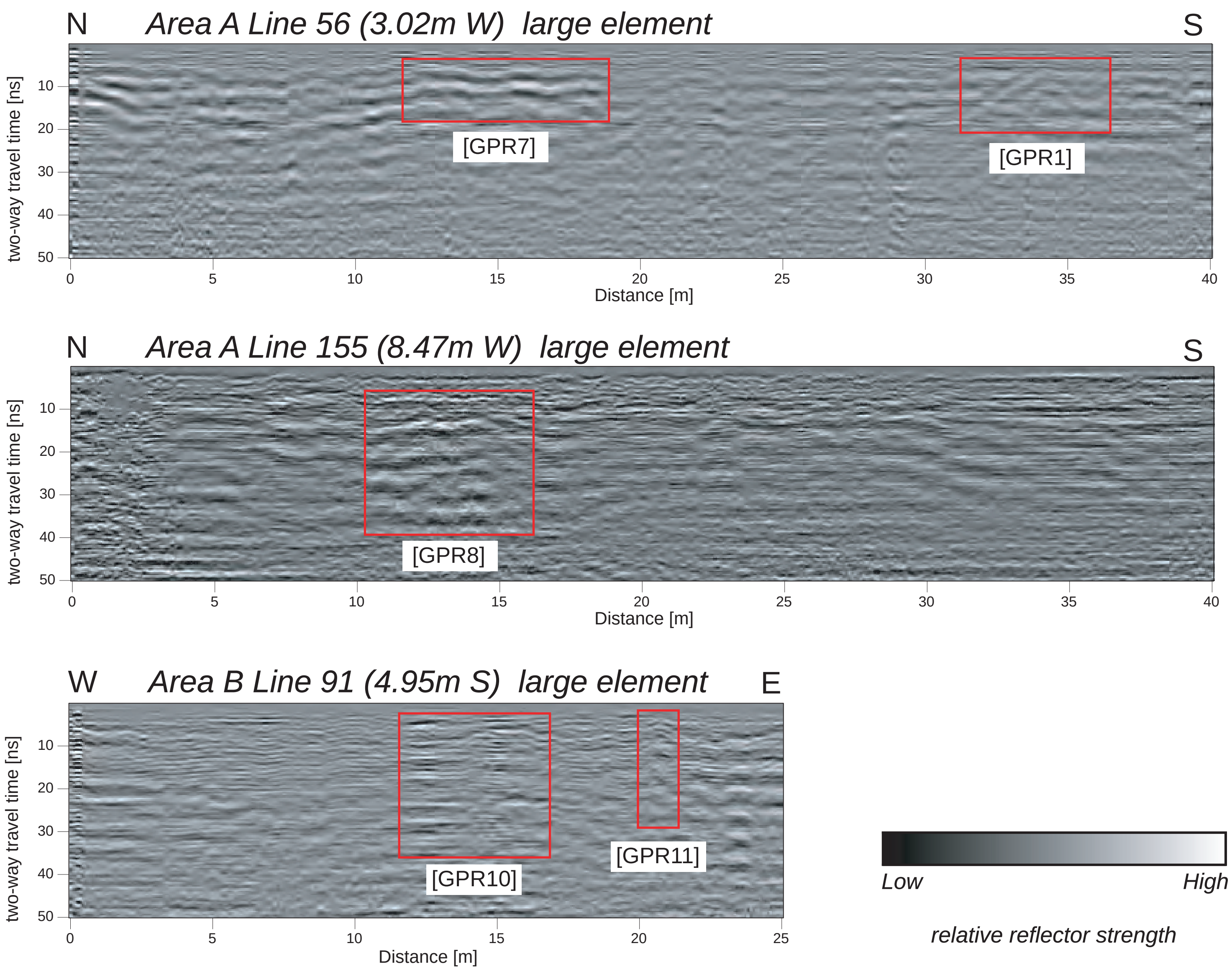
KEEP YARD, DOVER CASTLE, KENT
Selected GPR profiles, June 2008

Figure 8



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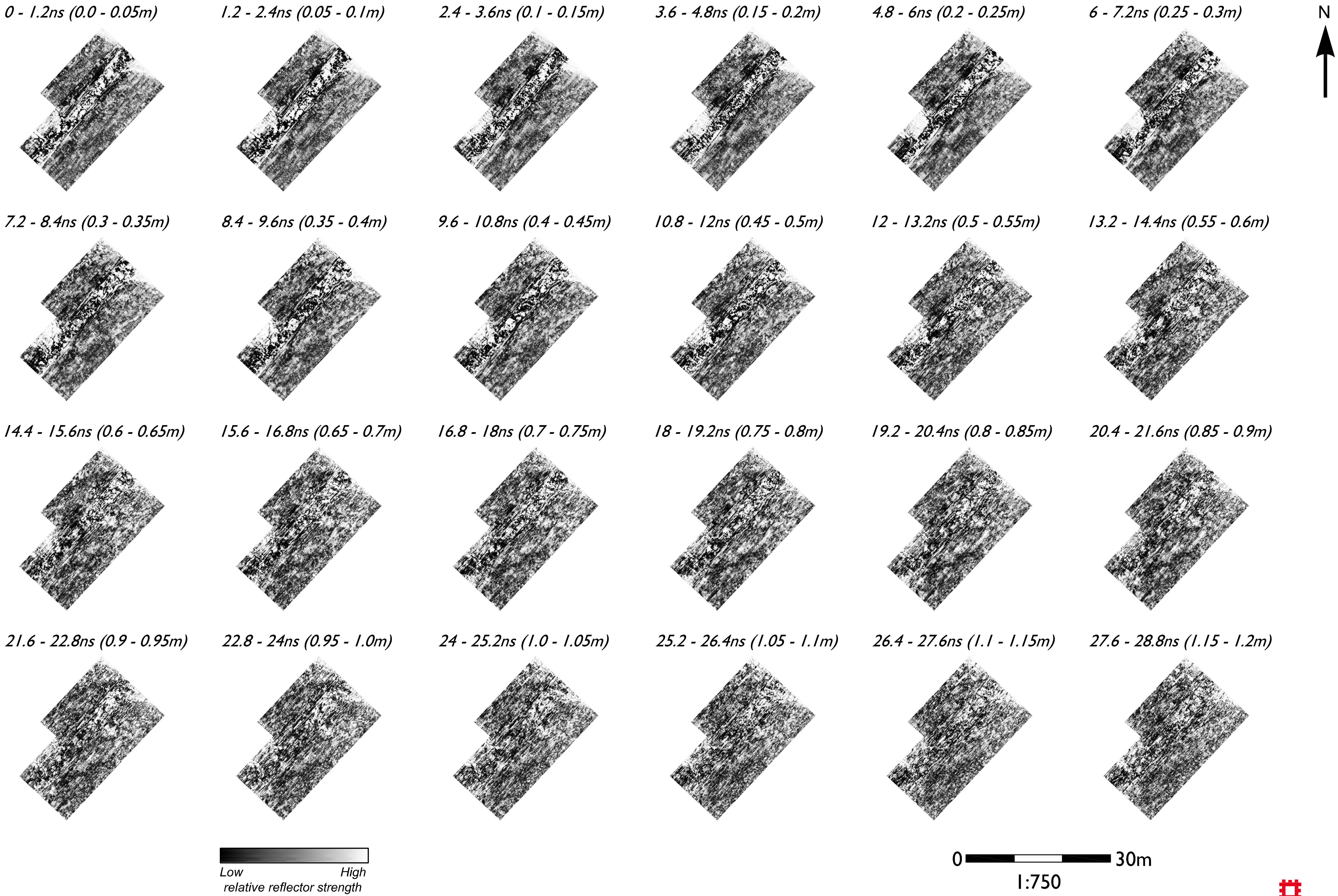
KEEP YARD, DOVER CASTLE, KENT

GPR Amplitude time slices, June 2008.

Figure 9(A)

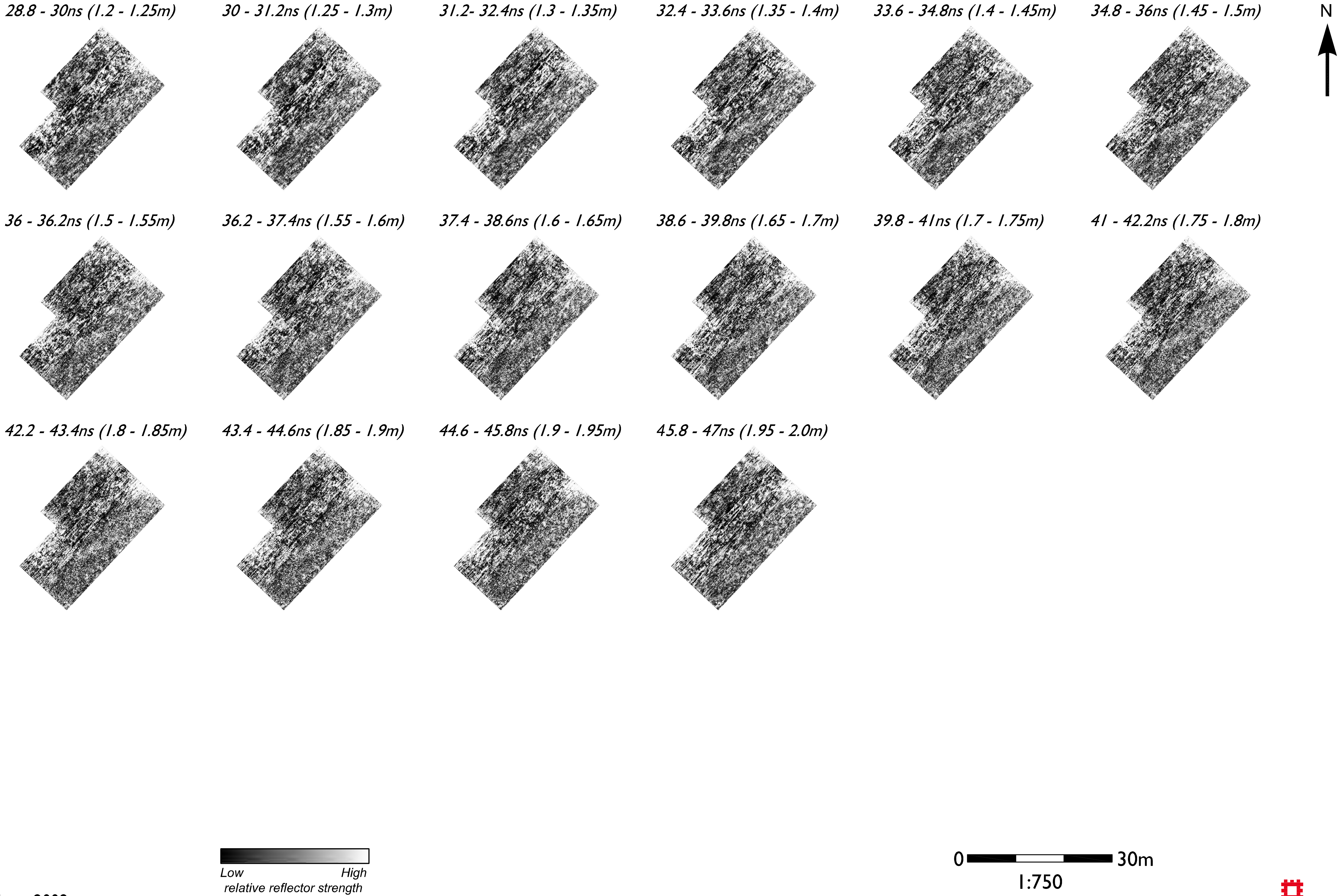


Geophysics Team 2008

ENGLISH HERITAGE

KEEP YARD, DOVER CASTLE, KENT
GPR Amplitude time slices, June 2008.

Figure 9(B)



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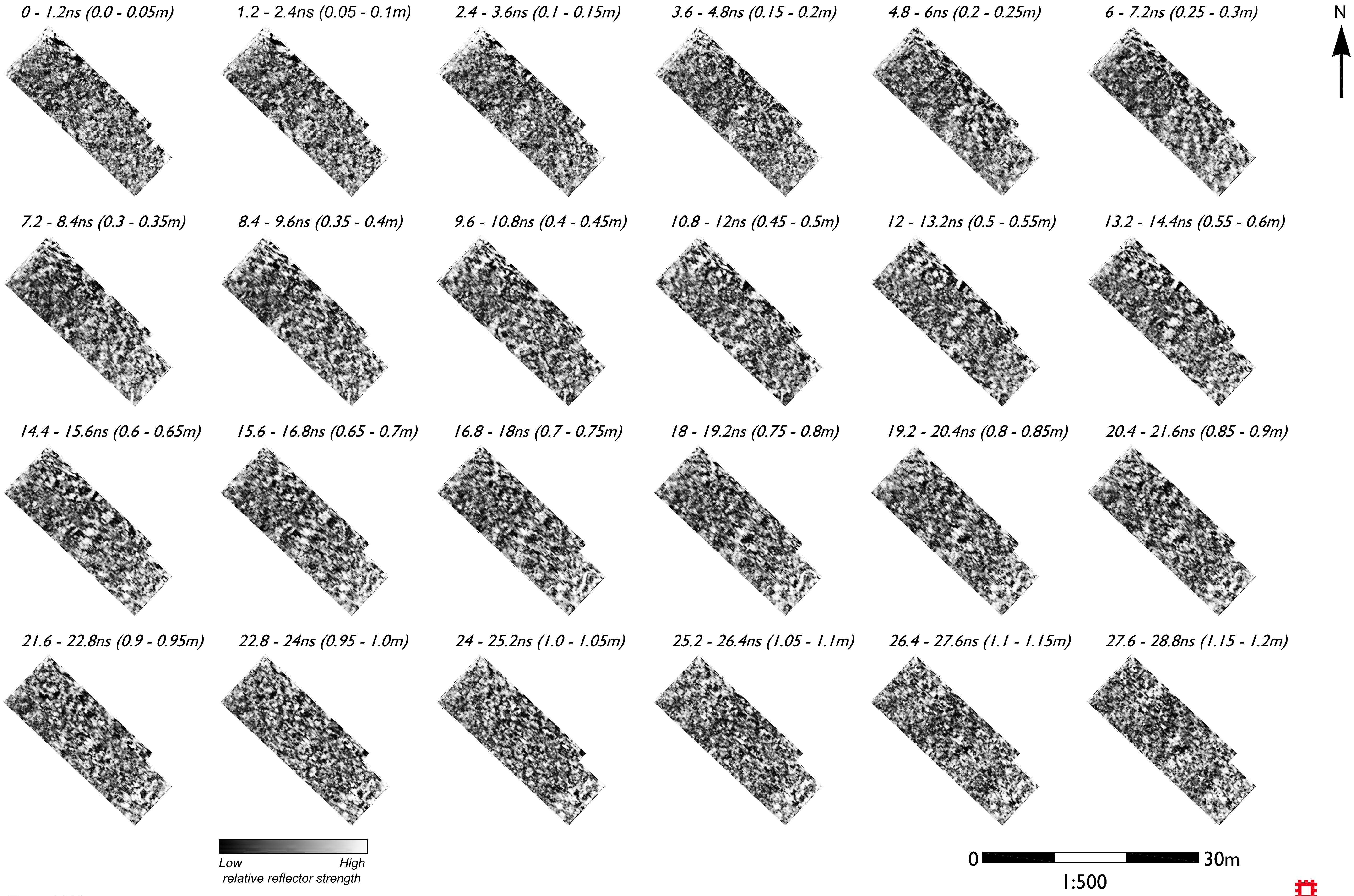
KEEP YARD, DOVER CASTLE, KENT

GPR Amplitude time slices, June 2008.

Figure 10(A)

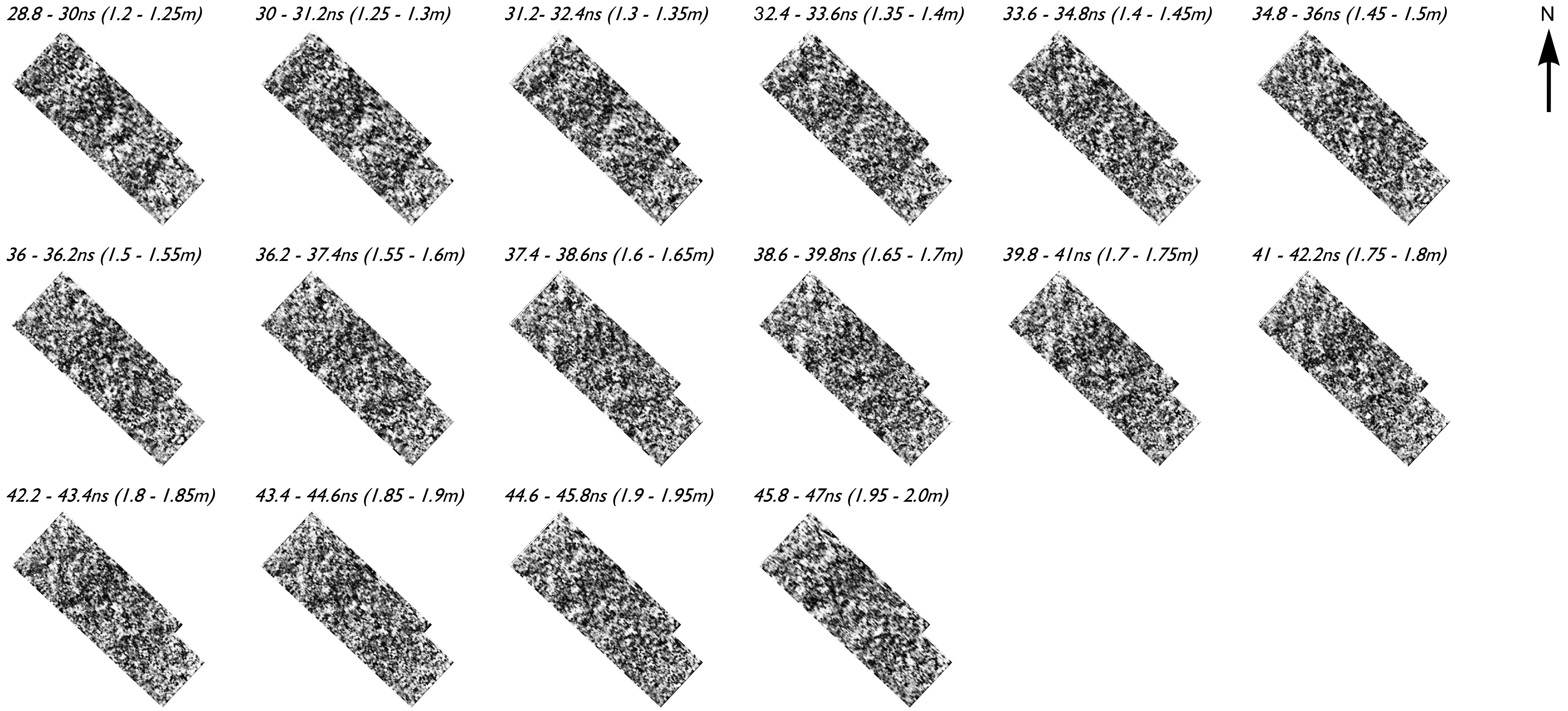


Geophysics Team 2008

ENGLISH HERITAGE

KEEP YARD, DOVER CASTLE, KENT
GPR Amplitude time slices, June 2008.

Figure 10(B)



Low High
relative reflector strength

0 30m
1:500

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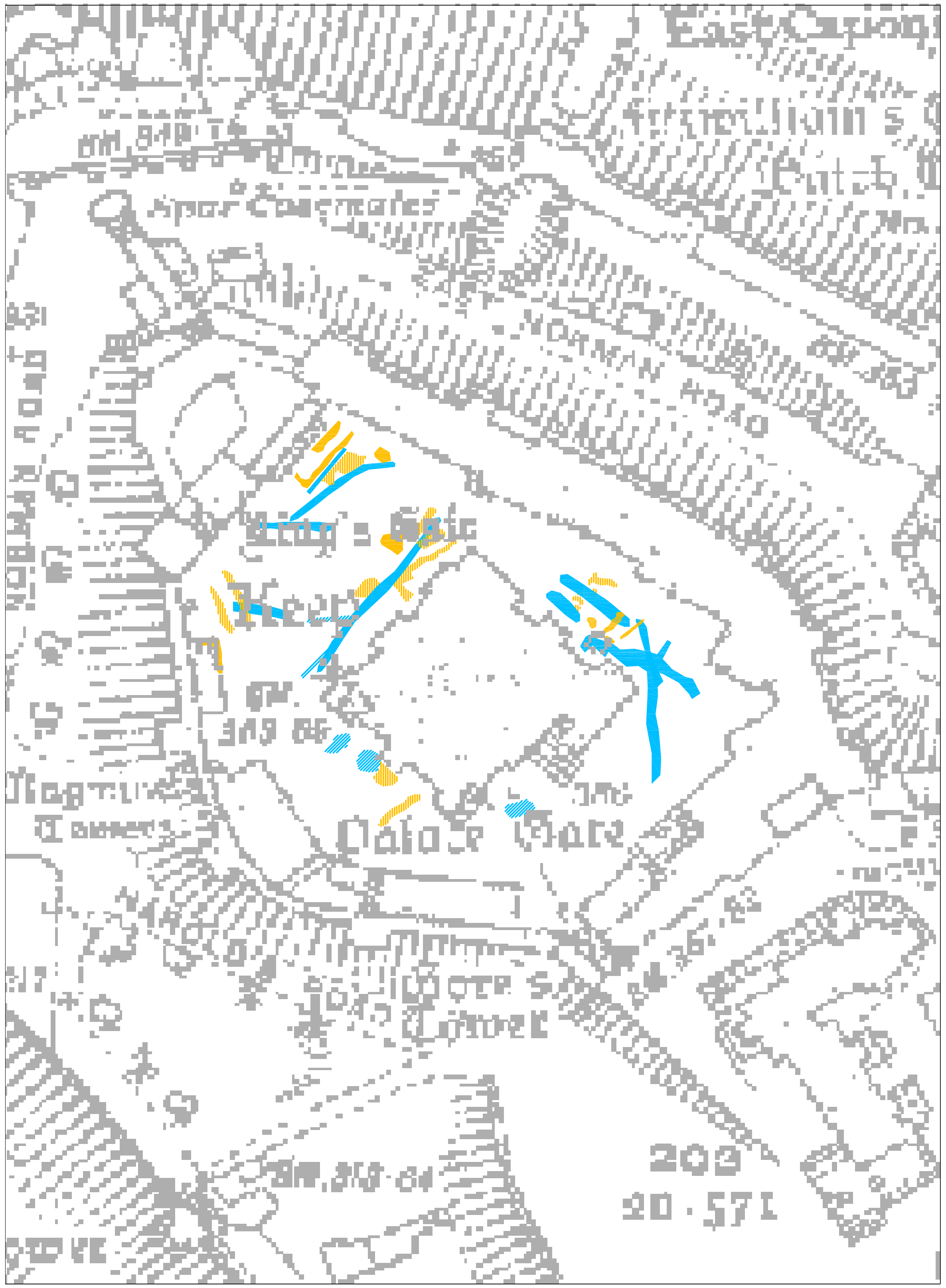
KEEP YARD, DOVER CASTLE, KENT

Location of geophysical surveys, June 2008.

Figure 11

A) OS Historic Mapping County Series: Kent 1937

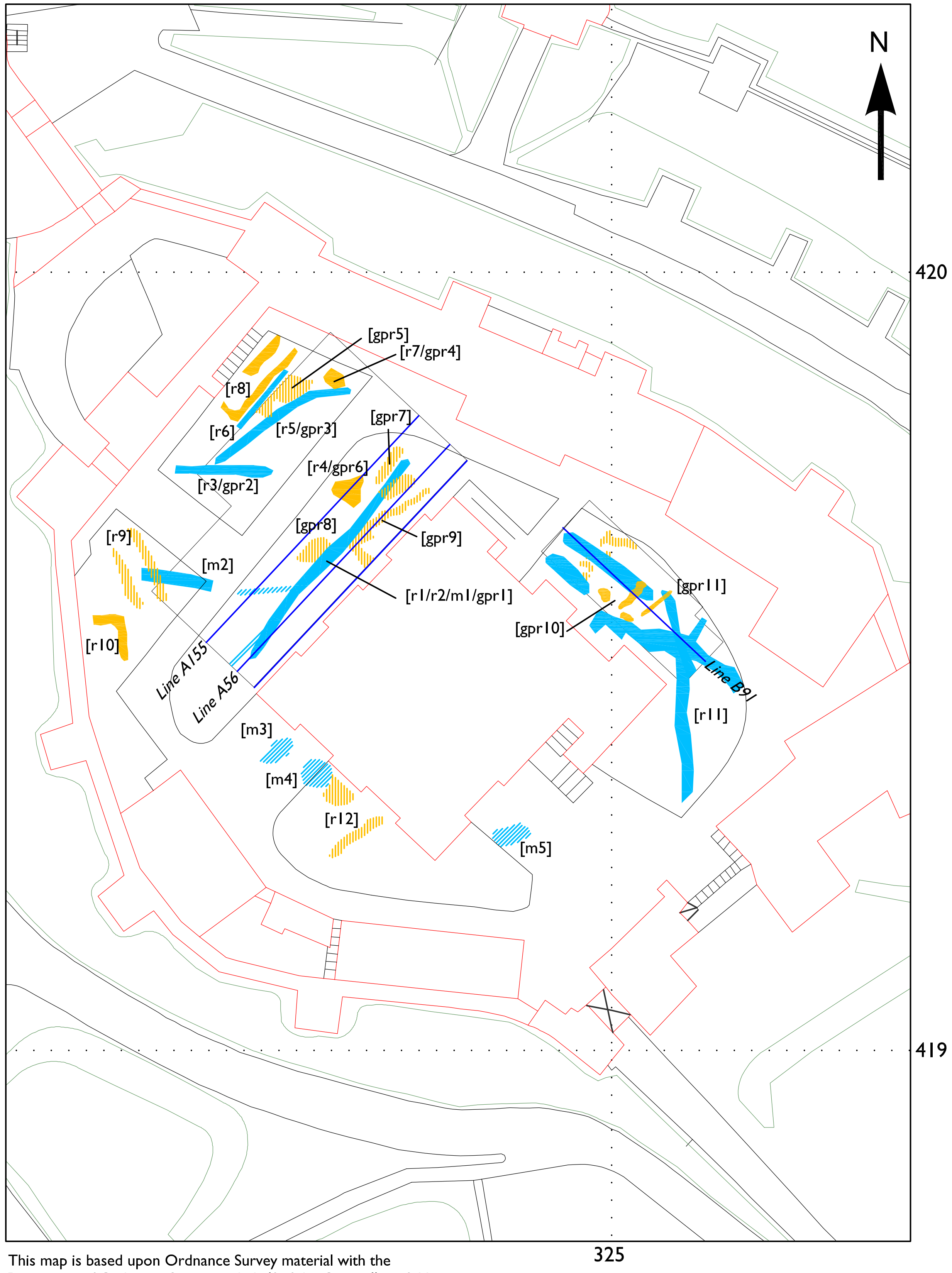


0 30m

1:1000

B) Graphical summary of significant geophysical anomalies

TR3241



0 30m

1:750

possible drain, ditch or conduit (more tentative anomalies shown as hachures)

possible wall fragment or building remains (more tentative anomalies shown as hachures)

Location of selected GPR shown in Figure 8

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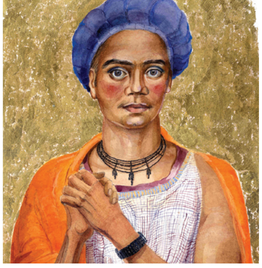



ENGLISH HERITAGE RESEARCH DEPARTMENT

English Heritage undertakes and commissions research into the historic environment, and the issues that affect its condition and survival, in order to provide the understanding necessary for informed policy and decision making, for sustainable management, and to promote the widest access, appreciation and enjoyment of our heritage.

The Research Department provides English Heritage with this capacity in the fields of buildings history, archaeology, and landscape history. It brings together seven teams with complementary investigative and analytical skills to provide integrated research expertise across the range of the historic environment. These are:

- *Aerial Survey and Investigation*
- *Archaeological Projects (excavation)*
- *Archaeological Science*
- *Archaeological Survey and Investigation (landscape analysis)*
- *Architectural Investigation*
- *Imaging, Graphics and Survey (including measured and metric survey, and photography)*
- *Survey of London*

The Research Department undertakes a wide range of investigative and analytical projects, and provides quality assurance and management support for externally-commissioned research. We aim for innovative work of the highest quality which will set agendas and standards for the historic environment sector. In support of this, and to build capacity and promote best practice in the sector, we also publish guidance and provide advice and training. We support outreach and education activities and build these in to our projects and programmes wherever possible.

We make the results of our work available through the Research Department Report Series, and through journal publications and monographs. Our publication Research News, which appears three times a year, aims to keep our partners within and outside English Heritage up-to-date with our projects and activities. A full list of Research Department Reports, with abstracts and information on how to obtain copies, may be found on www.english-heritage.org.uk/researchreports

For further information visit www.english-heritage.org.uk

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