

THE GPR FINDINGS IN THE APSE OF READING ABBEY CHURCH

**An analysis of the GPR findings with reference to the
position of the gaol's west tower in relation to the GPR findings of possible graves
at the east end of the Abbey church.**

John Mullaney, March 2018

PURPOSE OF THIS PAPER

The following is an analysis of the GPR findings in and around the apse of Reading Abbey church. It will examine the various hypotheses regarding the anomalies which the GPR revealed in the subsoil in this part of the Abbey.

The first theory, proposed by Stratascan, who carried out the survey, suggested that these were signs of graves, and that they most probably dated to the era of the Abbey. Another proposal has been put forward suggesting that these 'graves' could be related to the 19th century gaol. A further suggestion is that they may not indicate graves at all but some other lost feature, or features, specifically related to the west tower and/or skirting walls of the 19th century gaol.

PRELIMINARY COMMENTS

The OS map used by Stratascan dated to the late 19th century. Some of the OS map's markings and assumptions were not founded on corroborated archaeological evidence. The map was mainly based on the work of Albury who claimed to have done excavations in the church area, but whose work was never published and is not available today. It was also based, to a lesser extent, upon Englefield's late 18th century survey.

The compilers of the map placed the Abbey's High Altar just to the south of the 19th c. gaol tower and as such it appears on the map. Although this is one of the altar's possible locations it may well have been slightly further west, in the choir area. This possibility will be examined later. It should be noted that subsequent archaeology (Slade 1971-73) and the GPR scan corroborated the outlines of the inner and outer apses as they appear on the OS map.

METHODOLOGY OF THIS ANALYSIS

This work consists of a compilation of archaeological reports, the 19th c. OS map and the relevant section of the GPR survey. Where appropriate various features have been transferred and placed as overlays to facilitate the reader in identifying key elements relevant to the issues raised. There are five pages each with an illustration, or illustrations, marked as 'Figs.' and numbered one to five. These are followed by an analysis of the evidence and comments.

Fig. 1 shows the outline of the gaol on the 1870s OS map. The gaol's west tower and the skirting wall, as marked on the OS map, have been highlighted with a blue line.

Fig. 2 consists of two maps.

The left hand map

Highlighted are

1. in blue circles, the pillar bases as proposed on the OS map,
2. in purple rectangles, the GPR 'possible graves'
3. in a beige oblong, the site of the altar as it appears on the OS map,

(Fig. 2 contd.)

The right hand map shows

- a. The GPR scan, which was superimposed by Stratascan on the OS map.
- b. The outer and inner apses, marked in blue,
- c. The positions of the potential graves and altar. These are in purple and beige (as per the left hand map).
- d. The outline of the west tower, superimposed as a green circle.

Fig. 3

Dr Slade's drawings of his 1971-3 excavations

Fig. 4

Stratascan's images of the proposed graves. Stratascan's explanation alongside is also included.

Fig 5

An example of a GPR scan, showing graves, from another archaeological site, using the same technology as that in Reading, but not carried out by Stratascan.

COMMENT

This brings together a fairly complete picture of the relative positions of the main features on the various maps currently in the public domain.

What is missing is any information that the Museum of London Archaeology (MOLA) and the Ministry of Justice (MOJ), may have from their recent, (2017-2018), archaeological work, including their excavations.

In order to arrive at a more complete and historically accurate evaluation of the evidence it will be useful when their findings have been analysed and published.

Use has been made of the Historic Building Assessment (Oct 2014). However, detailed as this is in many respects, it also contains several factual errors which the author of this paper along with John Painter worked on, and which was reported to the Hidden Abbey Project Group and to Reading Borough Council.

Fig 1



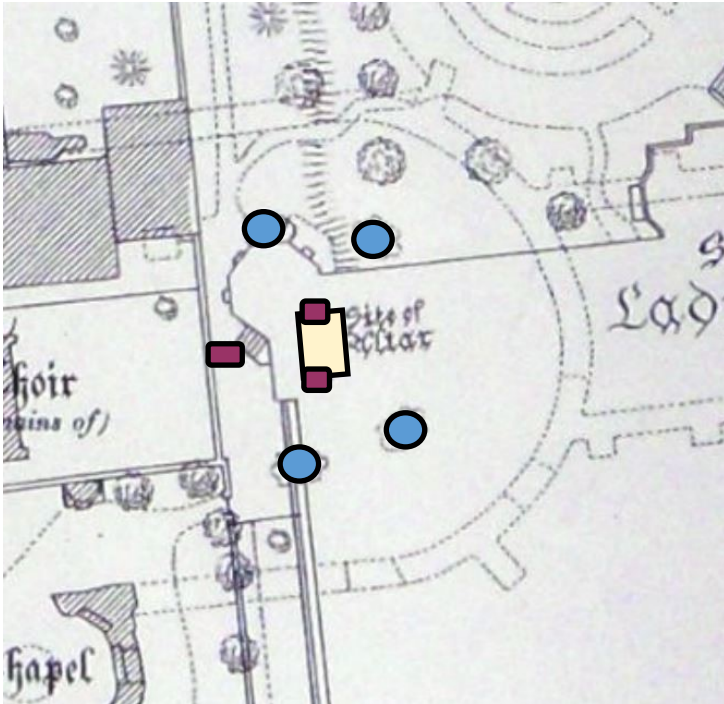
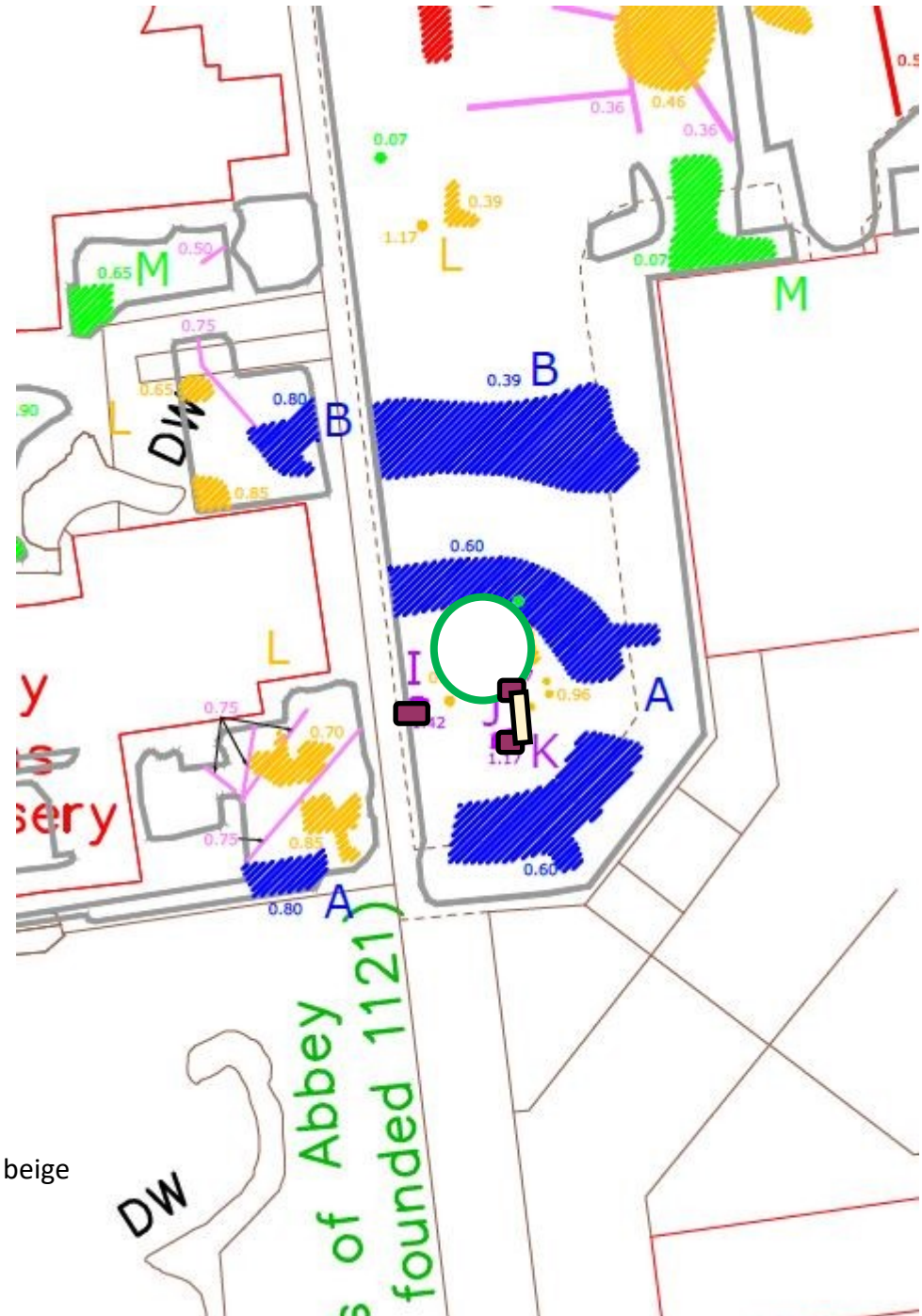


Fig. 2



Key to left hand map.

1. in blue circles the pillar bases as proposed on the OS map,
2. in purple oblongs the GPR 'possible graves'
3. in a beige oblong the proposed site of the altar on the OS map

Key to right hand map.

- a. The GPR scan, which was superimposed by Statasacan on the OS map.
- b. The outer and inner apses, marked in blue,
- c. The positions of the potential graves and altar. These are in purple and beige (as per the left hand map).
- d. The outline of the west tower, superimposed as a green circle.

Fig. 3

EXCAVATION AT READING ABBEY, 1971-73

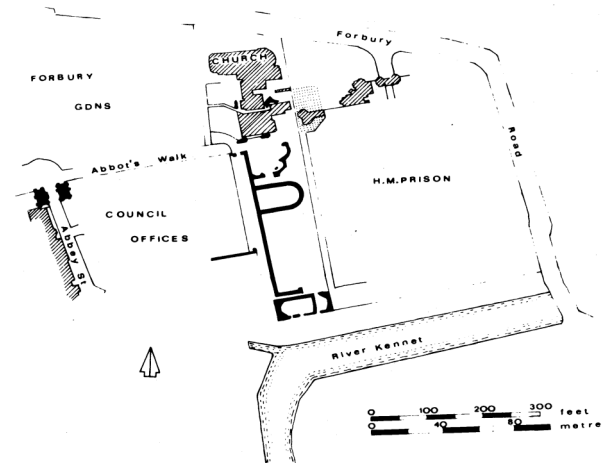


Fig. 1. General Plan. Visible remains of the abbey are shown in solid black. The area of excavation is stippled.

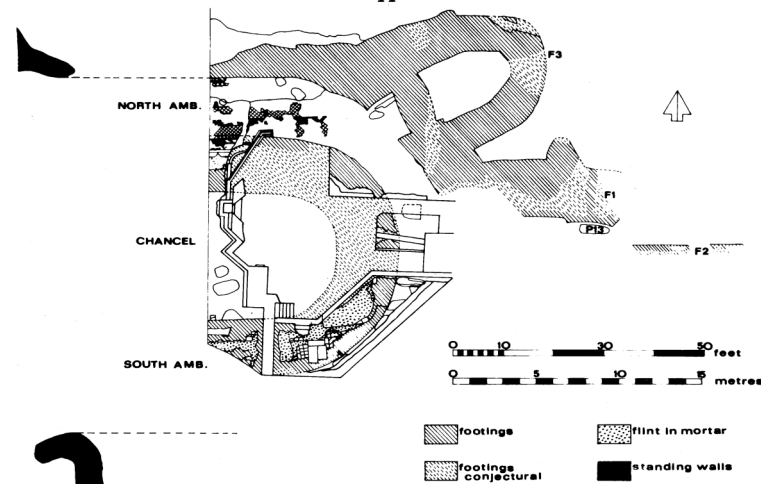
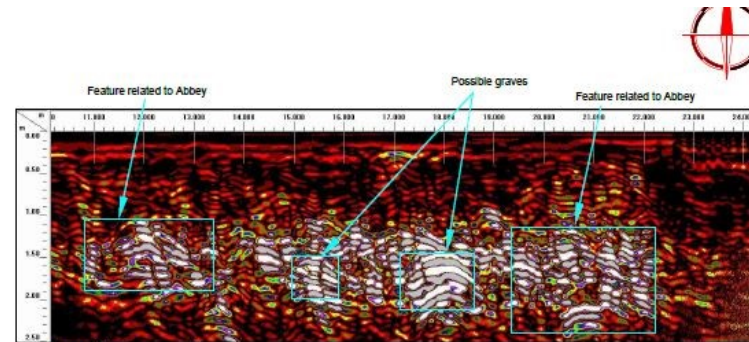
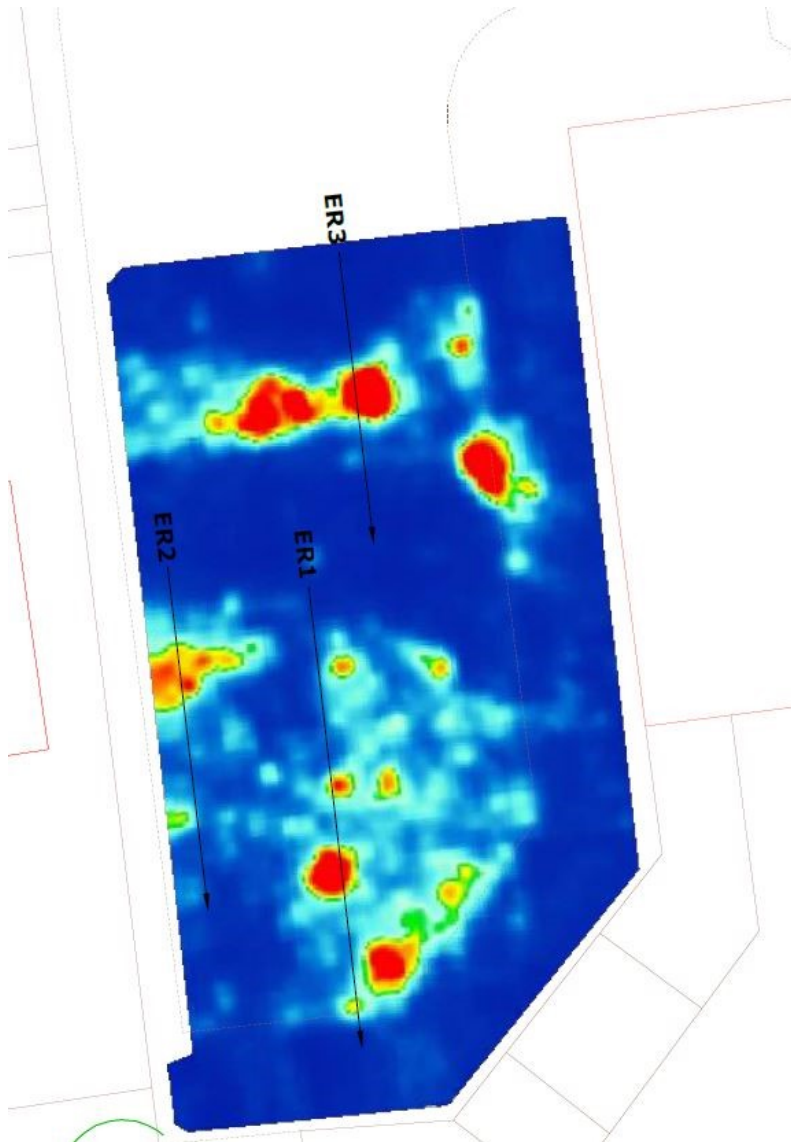


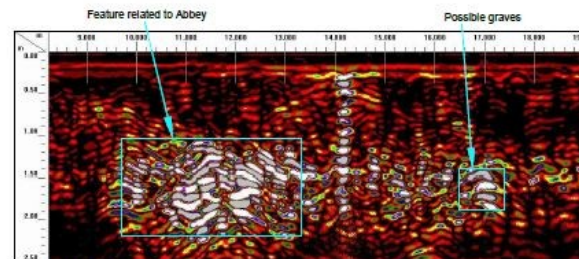
Fig. 2. Abbey Church; East End, General Plan. Outlines of later buildings are indicated by fine lines.

Dr Slade's drawings of his 1971-3 excavations
from the Berkshire Archaeological Journal Vol 68

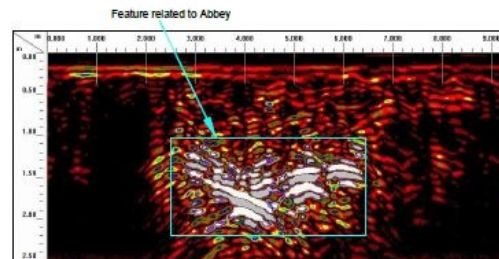
Fig. 4



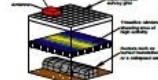



Example Radargram 1.
Possible graves and features related to abbey



Example Radargram 2.
Possible grave and feature related to abbey

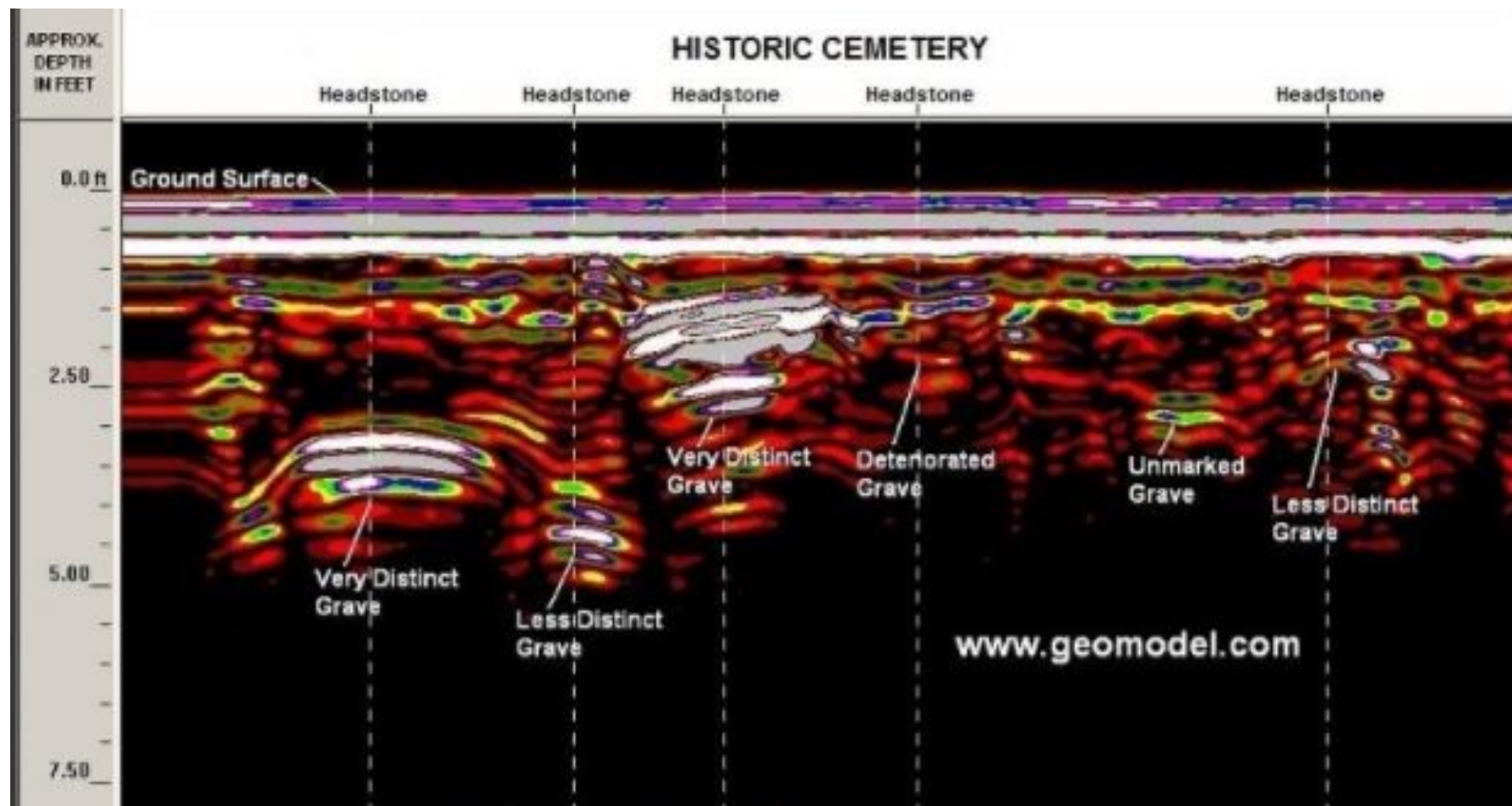


Example Radargram 3.
Feature related to abbey

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TIMESLICE PLOTS	
<p>The radar data is interrogated for areas of high activity and the results presented in a plan format known as timeslice plots. In this way it is easy to see if the high activity areas form recognisable patterns.</p> 	
<p>The GPR data is compiled to create a 3D file. This 3D file can be manipulated to view the data from any angle and at any depth within range. The data was then modelled to produce activity plots at various depths. As the radar is actually measuring the time for each of the reflections found, these are called "time slice windows". Plots for various time slices have been included in the report. Calculations, based on an average velocity, have been made to show the equivalent depth into the ground. The data was sampled between different time intervals effectively producing plans at different depths into the ground.</p> <p>The weaker reflections in the time slice windows are shown as brighter colours namely light grey. The stronger reflections are represented by darker colours such as dark grey and black.</p> <p>Reflections within the radar image are generated by a change in velocity of the radar from one medium to another. It is not unreasonable to assume that the higher activity anomalies are related to marked changes in materials within the ground such as buried foundations or surfaces within the soil matrix.</p>	
<p>Colour Scale for Timeslice 'Activity' Plots and Simplified Key</p> <p>High Energy Return -Possible Target</p> <p>Medium Energy Return -Mixed Ground</p> <p>Low Energy Return -Homogenous Ground</p>	
Client	
READING BOROUGH COUNCIL	
Project Title	Job No. J10003
READING HIDDEN ABBEY PROJECT	
Subject	
DUAL FREQUENCY RADAR TIMESLICE AT 0.9M WITH EXAMPLE RADARGRAMS	
 <p>GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING</p> <p>VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA</p> <p>T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk</p>  	

Stratascan's images of the proposed graves and other features. Stratascan's key and explanation alongside is also included.

Fig. 5



This shows a similar scan but in a totally different environment and by a different archaeological research company.

For further information see

<https://geomodel.com/applications/cemetery-and-grave-location/>

ANALYSIS AND COMMENTS of the interpretations of the GPR findings

Two major interpretations of the GPR scan have emerged. First of all there is that of Stratascan itself which states that many of the findings probably or possibly relate to the Abbey. Secondly there is a major challenge to this proposal which suggests that all, or most, of these findings, especially those of the proposed 'graves' are in fact traces of 19th and 20th century buildings.

It should be noted that Stratascan never categorically claims that their GPR results pertain to the Abbey, but cautiously use the words 'probable' and 'possible'.

The following is a summary of the two positions and how they are presented

STRATASCAN

In interpreting the geophys findings Stratascan made a clear distinction between those that are most likely to be Abbey related and other features. They are divided into six colour coded categories.

Cat 1. Deep blue - those areas probably related to the Abbey

Cat 2. Light blue - probable archaeological features—possibly relating to the Abbey

Cat 3. Red—Probable archaeological feature—this may relate to any period.

Cat 4. Yellow—Possible feature relating to the Abbey or other archaeology

Cat 5. Purple—Possible grave

Cat 6. Green—probable modern obstruction

The east end of the scan has been reproduced in this paper, together with their colour coding, Fig. 2.

Stratascan then gave more detailed analysis of Cat 5, the 'possible grave areas'. Their reasoning for reaching the conclusion is based on comparative research both by themselves and other geophys groups. Fig. 4 gives Stratascan's assessment showing the 'graves' in detail. Fig.5 presents the reader with the opportunity to compare the scan of the Reading site with that of another site, by a different research group, showing known graves.

THE ALTERNATIVE INTERPRETATION

However an alternative view has been proposed by the MOJ, namely that the 19th century warden towers in the car park area were significant and it is these that has been revealed by the GPR survey. The MOJ wording is “the rectangular responses within the east of the abbey church locale potentially being some of these remaining foundations, and not medieval graves. Also the human remains found in this location could be a later burial (of a prisoner) in the warden tower”.

Presumably this alternative interpretation is based on evidence from the work of MOLA on the prison site.

It should be noted here that human remains have been found in the vicinity, but their exact location is unknown and it is necessary to wait for the MOJ/MOLA report before this is clarified. For instance the MOJ refer to ‘human remains found in this location’. It is not clear whether they are referring to new discoveries or previous ones. Nor do they give an exact location, though they do reference the tower.

COMMENT

It is certainly strange that the GPR did not pick up the tower’s and wall’s footings. This is also true of a drainage ditch in the Forbury that was dug in the early 20th century with the discovery of 40 or so medieval bodies. It is necessary therefore to make an evaluation of the GPR findings and examine more closely both Stratascan’s interpretation and the alternative. As already stated, in fairness to Stratascan, their report does use the words ‘probable’ and ‘possible’, be it for the ‘footings’ or the ‘graves’.

It is well documented that executed prisoners at Reading were buried on site. It is possible that any human remains found in the area of the tower date to the first gaol. It is highly unlikely that these relate to the second gaol, as it would have meant digging either under the tower and wall, or very near to it, after its construction in the 1840s. Moreover the burial site of executed prisoners for the second gaol is well documented and is not in this area. Unless further evidence is forthcoming, it would seem highly unlikely that any human remains are connected with a burial in the ‘warden tower, as suggested by the MOJ. More reasonably one could postulate the theory that any skeleton found in this location dates to the first gaol. This would account for the rather strange feature of having a body near, or under, the tower and/or skirting wall which were part of the second gaol. One picture that has been circulated, of a skeleton in the Gaol site, showed what appeared to be that of a person with a broken neck, consistent with hanging.

It would be useful to undertake further analysis when the MOJ releases other photos of any further skeletons discovered, together with an account of their location, depth, skeletal analysis (which one assumes will have been done to ascertain the age of the body) and any other relevant information. As Historic England notes, this is a site of historic importance dating back a thousand years or more. One assumes that analysis and dating have been carried out by MOLA/MOJ on any human remains. This should determine the age of the human remains and help in the overall analysis of the site.

It should be noted that whenever there have been any excavations in the whole area, skeletons have shown up. These have been dated to possibly as far back as pre-Norman times. For example, when the north aisle of St James' church was being built in the 1960s, the builders/architect reported the discovery of what they described as Saxon graves. Their dates were not corroborated at the time.

Whether these skeletons were Saxon, or later, it is a fact that the area is known to have been used for burials since Norman times.

The land north of the Abbey church served as the burial ground for St Lawrence's church, until the reign of Queen Mary Tudor, when it was moved to its current location.

It has been argued that the existence of this medieval graveyard is in fact one indication that there was a pre-existing Saxon, or Norman-Saxon, church before that of the 1121 Abbey. This is based on our knowledge that the decree of the Council of Clovesho (8th century) ordained that 'where there was a church there should also be its cemetery', and likewise 'no cemetery should be created except alongside a church'. The discovery, by Slade in the 1970s (Fig. 3), that under the Abbey footings in the apse area, there were further foundations, which he proposed belonged to a pre existing Saxon or Norman –Saxon building, lends weight to this theory.

Several commentators have argued that the monks of the 1121 Abbey tolerated the anomaly of a town churchyard within their monastic precincts because it was already existing sacred ground. This is of course open to debate, but the one fact that is known for certain is that there were graves in this area from the time of the Abbey. What is not known is how far any such possible pre 1121 Abbey graveyard extended. It may be that it came round to the area where the apse of the Abbey church was built. If this is the case then further examination of any skeletons and graves is required to ascertain their dates. It may be, for instance, even if the skeletons have been disturbed and vanished, that other material such as pottery, grave goods or other archaeology may be able to help establish a date and the use this area of land has been put to over the centuries. It should be noted that it has been proposed that there was a cemetery, possibly for the monks and/or other persons associated with the Abbey, north of where the Lady chapel (1314+) was built.

It is certainly possible that some of the GPR scan shows footings for 'modern' structures, Victorian or otherwise. However the very clear soundings of the inner and outer apses of the Abbey church (Fig 2—right hand) marked in deep blue, show a 100% conformity with the archeologically evidence of both the inner and outer apses as confirmed by Slade's 1970s excavations (Fig 3).

This evidence challenges the suggestion that *the GPR survey could be showing later building works from the Victorian period and that this could have impacted / destroyed quite a bit the medieval remains*. It would be interesting, however, to receive further comment and support from the MOJ for their viewpoint. It must be assumed that, in order for the MOJ to make this claim, there is further evidence that has not been released.

It may of course be that the MOJ are referring to another area of the car park or indeed prison site. In which case the MOJ's comments are totally irrelevant to the issue at hand, namely whether the graves shown in the GPR scan relate to the 1121 Abbey.

Having considered the above propositions it would be useful to consider some other possible explanations for the GPR results

ARE THE GPR ANOMALIES POTENTIALLY MEDIEVAL GRAVES?

First of all it is necessary to consider whether the GPR anomalies are consistent with what one may expect to see on a GPR scan when looking at graves, whatever their dates.

Stratascan is a world leading archaeological body with the necessary expertise and experience to assess such geophys findings. Their assessment must be accorded appropriate respect, even if challenged.

Fig. 4 gives the details of the scan and Stratascan's evaluation of the evidence. Fig. 5 gives another example of known and proven grave sites identified by a GPR methodology similar to that used at Reading. The comparisons are clear.

From the above geophys. evidence it is reasonable to accept the hypothesis, not necessarily the fact, that the Reading Abbey apse features may be graves. At this point no date for these graves is being proposed. They may be medieval or of a time later.

However to assert that these are related to Victorian or other modern buildings overlooks the fact that such footings or foundations would show up as solid lines, such as the blue area in Fig. 2. It would appear, therefore, that these are not the remnants of footings

but of collapsed soil/infill. If we assume that this anomaly appears because the solid footings have been removed, then we encounter the problem that the remaining areas (purple in Fig. 2) are very small indeed in relation to the footings that would have existed. Such foundations would surely have left more traces than these two or three very small rectangular anomalies. Moreover, except for the more northerly purple rectangle, they do not coincide with the tower or the walls. They just do not appear in the right place to have a connection with either of the two 19th century gaols. The first gaol was in fact far further to the east and as far as can be assessed there were no structures in the area under review.

All this of course is hypothetical and stands to be corrected should excavations show remains to a far greater extent than those that appear on the GPR.

What is apparent is that the three anomalies are centred on the approximate location of the high altar. This could be a coincidence, but it is one that needs examining.

It should be noted that the location of the altar is based upon comparative evidence from other such churches. Its exact location is unknown but it would have been in the eastern section of the choir. Altars, unlike graves or walls, would generally leave no archaeological trace. High Altars were built on a raised area in the choir and did not require foundations. They were frequently placed over a crypt, or burial site, containing the relics of saints. However it is generally agreed, and to date there is no archaeological evidence to contradict this, that Reading Abbey did not have a crypt. One might speculate that if these are indeed graves and, if the altar was placed over them, one grave to its north and the other to its south, then it is possible that these were places where relics had been buried and that the altar was subsequently built over them.

CONCLUSIONS

1. It is possible that the burials took place after the altar had been installed. This would have necessitated excavating under the altar to make the burial — a difficult but not an impossible task. If the altar was indeed further west then these graves would have been behind it.
2. It is very unlikely that we will ever be able to give Reading's High Altar's exact position. However it is possible to estimate this, to within a few yards, from the configuration of the inner apse and by comparison with other similar churches.

3. It is possible that the altar was marginally to the west of the position shown on the OS map. If this were the case, and if these two items were graves, then they would have been just behind the altar area. This is a feasible proposition.
4. It is necessary to reiterate that geophys. evidence indicates that they most likely are graves. Stratascan states that the anomalies in Fig.4 show soil disturbance consistent with those found for grave/burial sites. Certainly comparative data from other GPR scans such as shown in Fig. 5 corroborate this assessment.

Dating the anomalies, be they graves or some other feature.

Is it possible that they are graves of prisoners who died or were executed in the late 18th or 19th centuries?

The graves, if indeed that is what they are, in the scan appear to be discrete and individual. Prisoners were not accorded such respect but were buried in lime pits, most often alongside, or on top of, other corpses. It is unlikely, though not impossible, therefore, that they date to either of the gaols, but, for the reasons given above, not to the second gaol.

To be absolutely sure it would be necessary to excavate the 'graves' and carry out the necessary testing of any remains.

If these are graves, could they be associated with Reading Abbey and if so, whose graves are they?

For the past several years there has been interest in discovering whether Henry's remains are still in situ. There is undisputed proof that Henry was buried 'in front of the high altar'. Are his remains still there?

The GPR scan indicates three possible graves, subject to the provisos listed above. As we have seen, Fig.2 shows two possible graves one to the north, and another to the south, of the proposed location of the high Altar. A third similar anomaly appears to the west of the high altar. This is situated in a central position in the choir area, in other words approximately where Henry is known to have been buried, namely in front of the High Altar.

A great deal of caution needs to be expressed at this point. First of all it would be necessary to ascertain whether this anomaly really is that of a grave. Secondly, if possible, it would need to be dated to the correct time period. And thirdly, even if it could be shown to be a grave dating to the 12th century, positioned in front of the high altar, it would not prove that it was Henry's grave. At least two

other people were buried in this location. One was Henry I's great grandson, William. This was Henry II's first son who died aged only two and was buried at the feet of his grandfather, Henry I.

According to Hurry, Constantia, daughter of Edmund de Langley, Duke of York, wife of Thomas, Lord Despenser, Earl of Gloucester, was also buried before the High Altar. Other dignitaries such as Reginald, Earl of Cornwall, were also buried at Reading. It would not have been unusual for nobles and major benefactors to be buried behind the High Altar.

Assuming that Henry had been buried in the customary way with his head facing east, and so with his feet at the end nearer the altar, then William would have been interred between Henry and the High Altar, in fact nearer to the altar than Henry. As we do not know the exact location of Constantia's burial site 'before the High Altar' it is not possible to comment further on this except to note the known presence of graves, as mentioned in historical sources, in this location.

If the GPR soundings are of a grave, and a grave of that period, it is therefore possible that this feature is the grave of William. Its location, in a position near where the altar indubitably was placed, is consistent with all the records of his burial. Its proximity to the High Altar leaves little space for another burial in the remaining area. It should be remembered that there was a substantial effigy of Henry I, which would have occupied a significant area of the choir. The Cluniac Benedictine liturgies required a great deal of space around the High Altar as the monks and celebrant circled round it. For instance the celebrant would have needed room to incense the altar and Henry's effigy as well as the monks and other parts of the choir area. He would have been followed by a train of assistants whilst he performed these and other rites. In other words the ceremonies required space and were not to be restricted by objects too close to the altar.

So what does this mean for Henry I ? It should be noted that this third burial site appears to be partly under the wall dividing the prison car park from St James' school. If the above hypothesis is accepted then Henry would have been buried a few feet to the west of this, where today there is the rear school playground, or under the school room.

CONCLUSIONS

This analysis presents several possible explanations for the anomalies shown up in the GPR survey. Owing to the paucity of evidence and, to date, lack of information from the MOJ about the MOLA excavations, it has been difficult to make a full appraisal of their statements. The opinions expressed in this assessment are based upon known facts but without fuller information they must be accepted as provisional upon receiving the results of the MOLA excavations.

However certain incontrovertible facts are available to help in the assessment of the site and these have been mentioned in this paper.

These are:

1. the fact that the area has been used as a graveyard, at least from the founding of the Abbey.
2. that there were burials in front of the high Altar and this is the area that is under review.
3. the GPR scan confirmed the footprint of the inner and outer apses as proposed by Englefield and Albury and excavated by Slade.

In addition there is strong evidence that:

1. Stratascan's interpretation of the scan is correct and that the anomalies represent graves
2. The more westerly of the anomalies is in the correct position for the grave of William, son of Henry II and this would lead us to a more precise location for the burial site of Henry I. It could also be that of Constantia. In which case one would assume that the graves of William and Henry are yet further to the west in the choir area, which would probably place them to the west of the playground or under the schoolroom.

Without further scientific research, excavation, DNA analysis and sharing information, it will be impossible to make a more considered and full historical analysis of this most historic site.

For further information see the 'Friends of Reading Abbey' website, the Reading Museum website and www.readingabbeyhistory.com