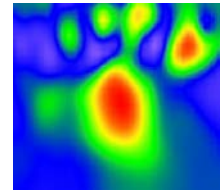




# St Grada and Holy Cross Church survey by GeoDefinition Limited and Camborne School of Mines



undertaken free of charge

14<sup>th</sup> September 2020

Three survey lines using Electrical Resistivity Tomography (ERT) with Induced Polarisation (IP) were undertaken in the churchyard to check an area without headstones for the presence of old graves. Two lines were run in the area without headstones whilst a third line was run across the main area of marked graves to act as a “calibration” for the data from the first two lines.

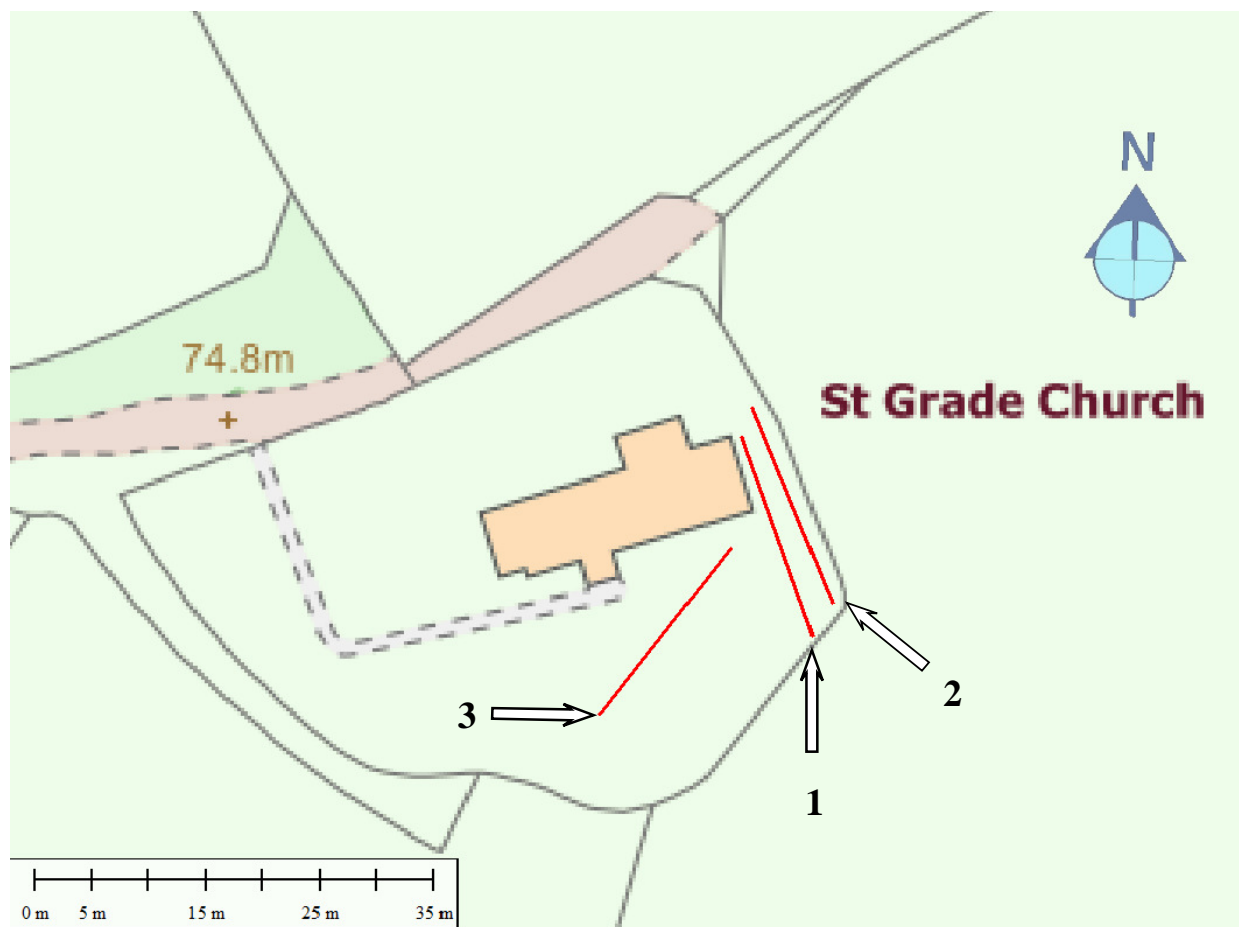


Figure 1: Location of the 3 survey lines within the churchyard. The arrows indicate line number and point to the end of the line at to the left in the following figures.

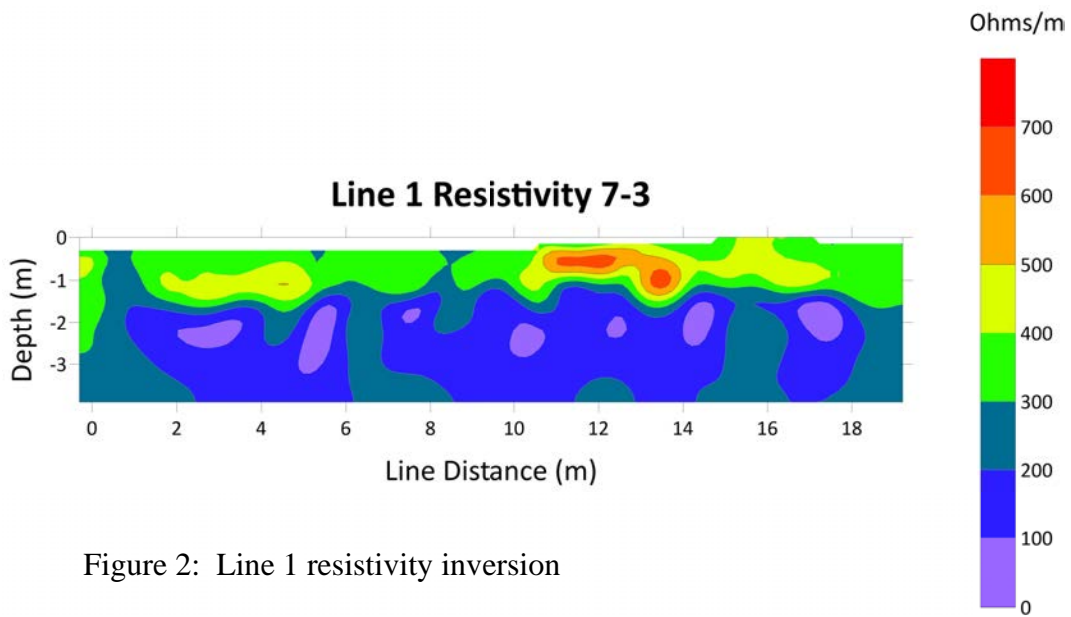


Figure 2: Line 1 resistivity inversion

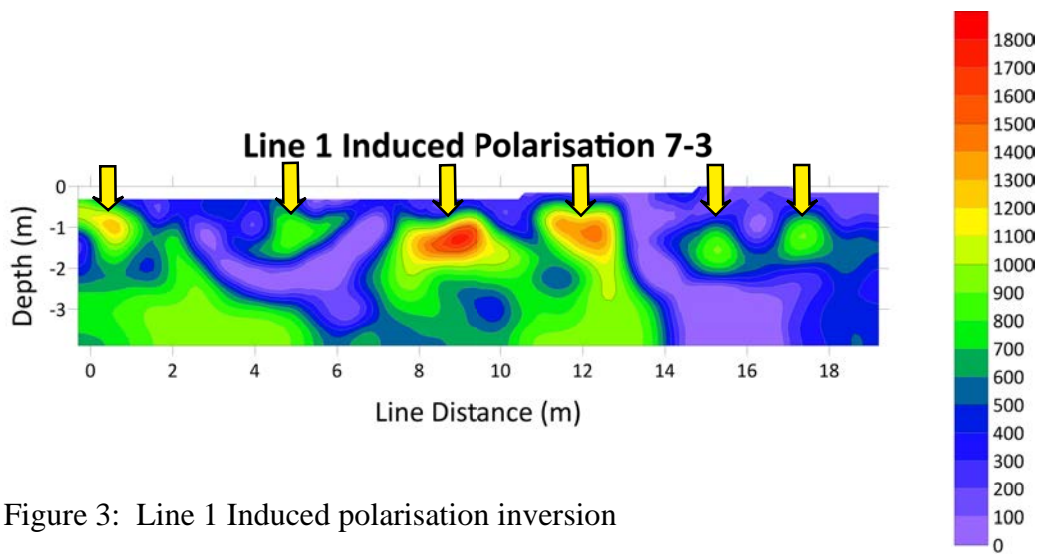


Figure 3: Line 1 Induced polarisation inversion

The ERT data at Figure 2 clearly shows a 2-layer soil system with the upper layer having a depth of a little less than 2 metres, or approximately 6 feet. This is consistent with a layer of soil that has been heavily disturbed.

The IP data at Figure 3 is sensitive to sulphides and clays. The yellow arrows indicate a fairly regular pattern of elevated sulphide readings at depths between 1 and 2 metres below ground level. This is entirely consistent with the presence of graves. The middle pair of arrows indicate more expansive and concentrated areas of elevated induced polarisation suggesting the presence of multiple burials, apparently in the same extended grave.

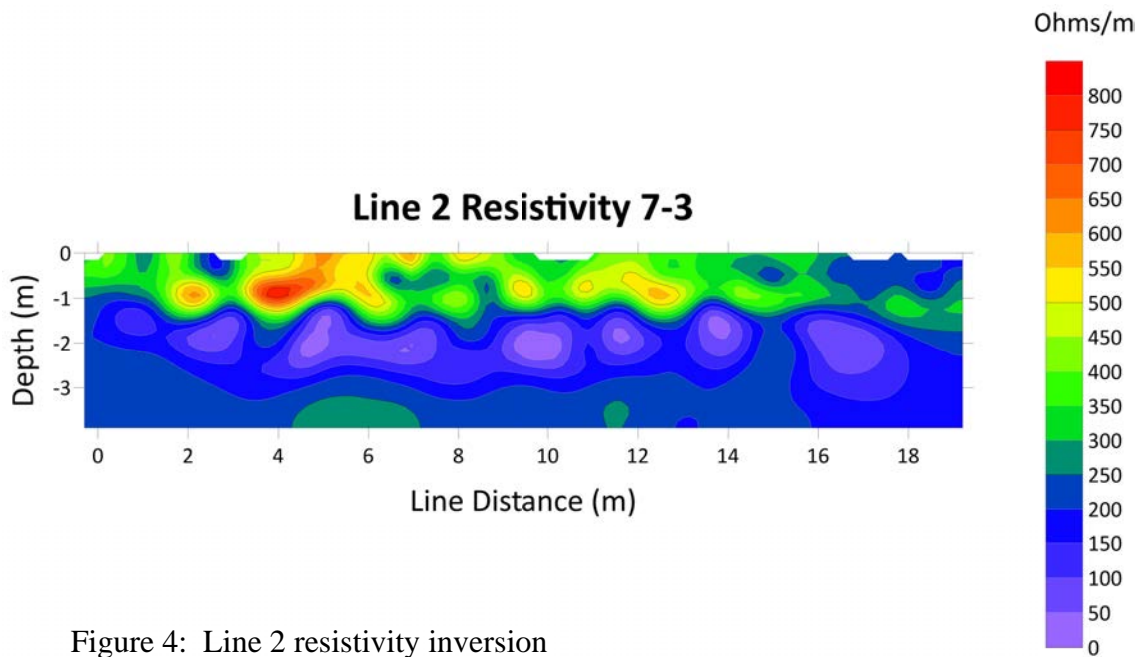


Figure 4: Line 2 resistivity inversion

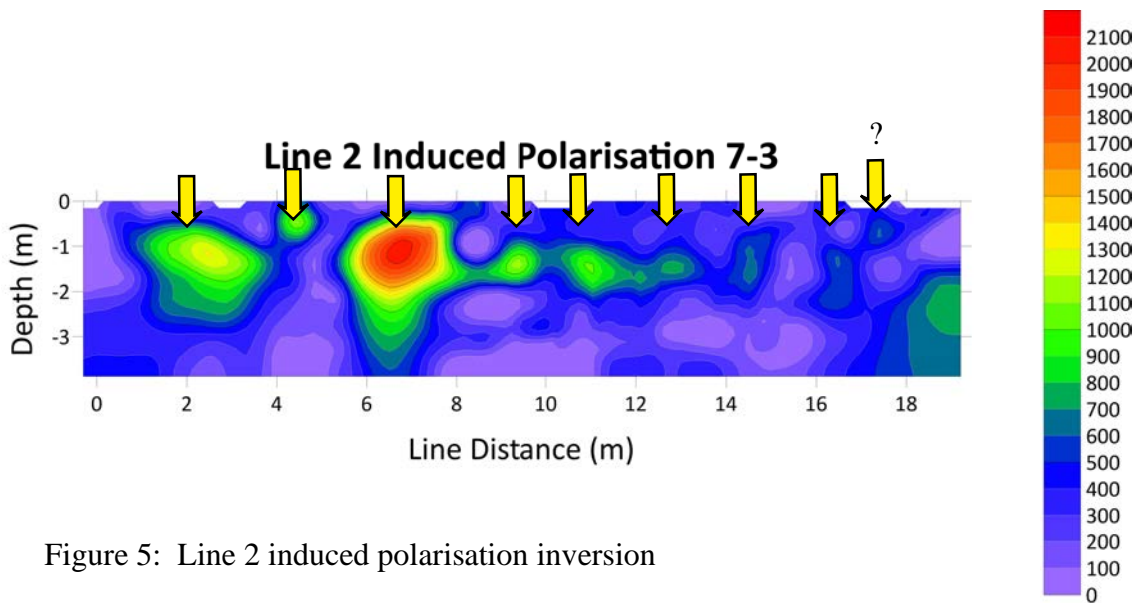


Figure 5: Line 2 induced polarisation inversion

Parallel to Line 1, Line 2 shows a similar upper soil layer extended to a depth of about 1.5 metres below ground level, consistent with disturbed ground, although the intensity is less towards the far end of the line.

The induced polarisation shows a more varied pattern than Line 1. There are a number of discrete areas of elevated induced polarisation at a depth that would be consistent with graves. The anomalies at 2 to 4 metres and at 6 to 8 metres are relatively expansive and are consistent with the presence of several bodies in the same grave. The second anomaly at a line distance of just over 4 metres is exceptionally shallow. Towards the second half of the line the induced polarisation anomalies are mostly consistent in depth but are much smaller and less intense but are mostly at a consistent depth. This could be consistent with the burial of infants. The very small anomaly furthest along the line is at about half the depth of the others, similar to the second anomaly from the left.

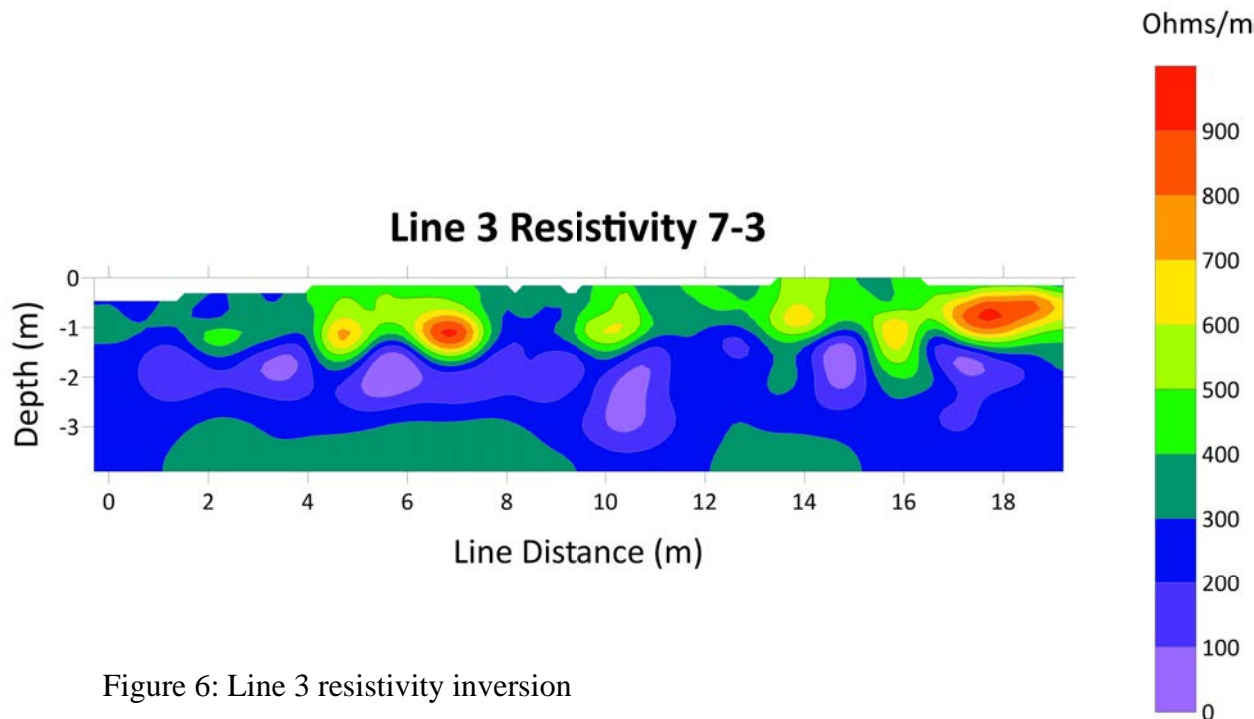


Figure 6: Line 3 resistivity inversion

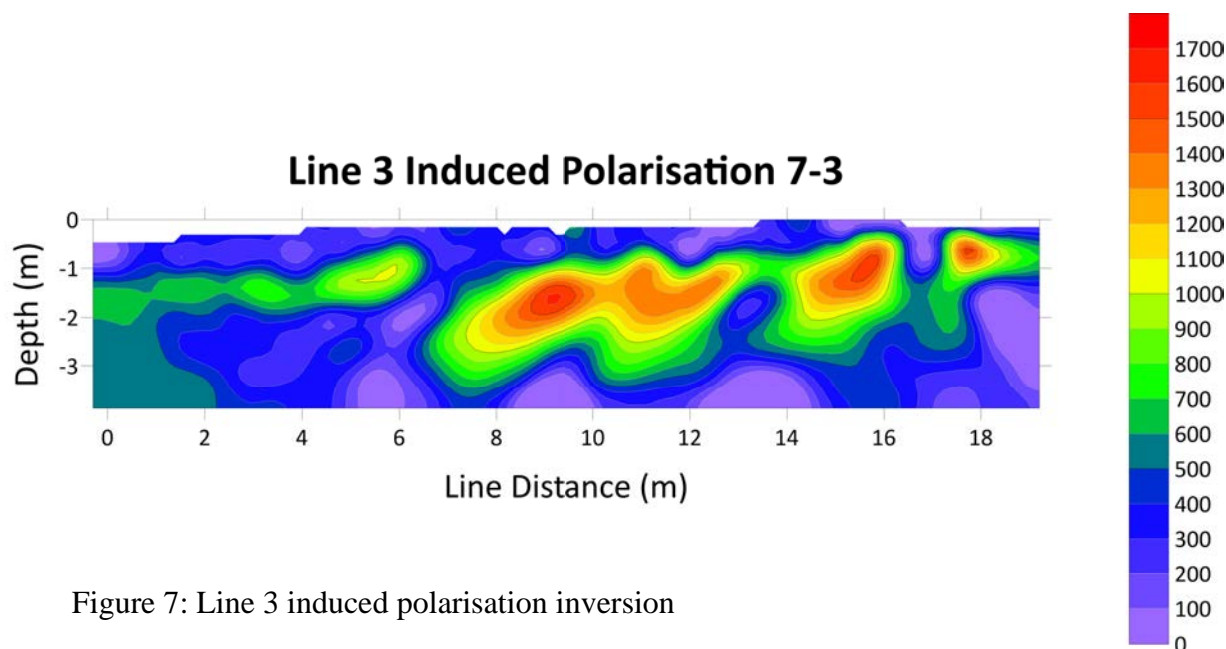


Figure 7: Line 3 induced polarisation inversion

Line 3 illustrates the response obtained from an area of largely marked graves, although it should be noted that the line runs diagonally across the line of the graves whereas lines 1 and 2 run perpendicular to the assumed line of any graves.

The upper layer of disturbed soil is again evident in the resistivity data. The lateral spread of the graves indicated in the induced polarisation is likely to be exaggerated by the angle of the survey line but the general pattern is similar to that observed in Lines 1 and 2.

## **Conclusions**

The area of churchyard without headstones appears to contain a regular pattern of graves across its full extent. The area along the edge of the graveyard at the eastern end of the church appears to have been used for the burial of infants. The graveyard therefore appears to be full.

## **Survey Notes:**

The survey was undertaken on Monday 14<sup>th</sup> September by Neill Wood and Roz Knight. The equipment used was a FlashRes 64 for for ERT and IP, and a Trimble R2 for geospatial data. Both items of equipment were provided by GeoDefinition Limited. The weather on the day of the survey was dry and sunny. No issues were encountered.

The data was processed through inversion using software from ZZ Geo (the manufacturer of the FlashRes 64). Images were prepared for display using Surfer software and mapped using Global Mapper software.

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