



## Geophysical survey of the burial ground and the interior of Kildalton Chapel, Islay

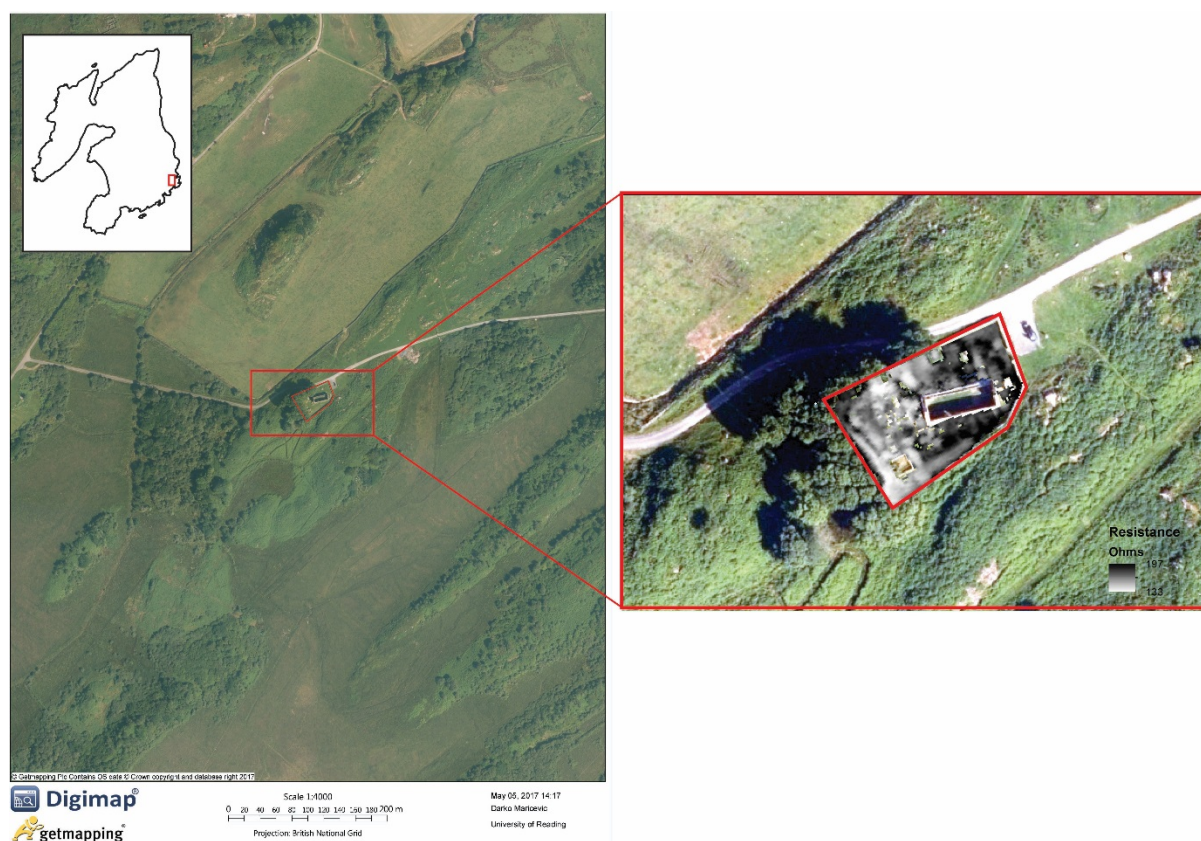


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## 1. Introduction

Islay Heritage ([www.islayheritage.org](http://www.islayheritage.org), Scottish charity no. SC046938) has commissioned a geophysical survey of the burial ground and the interior of the Kildalton Chapel (Figure 1) as a part of broader archaeological scope involving photogrammetry, laser survey, 3D modelling and a digital reconstruction of the chapel, the early Christian cross and the burial ground. The geophysical survey was carried out by a team from the University of Reading on the 18<sup>th</sup>-19<sup>th</sup> March 2017. The fieldwork included the resistivity survey of the full extent of the burial ground and the interior of the chapel accompanied by the topographic survey of the burial ground and the surrounding terrain, survey of the upstanding and recumbent gravestones and generic photography.



*Figure 1 Insert map of Islay showing the location of Kildalton Chapel with the aerial view of the area and the extent of the resistivity survey.*

## 2. Methodology

The electrical resistance survey was carried out using *Geoscan RM15* resistance meter with the twin probe electrode configuration. The readings were taken at 0.5m intervals along the traverses with 0.5m spacing. The data was processed using *Geoplot* software.

Topographic survey and mapping of the burial ground was carried out using *Leica GS09* GPS rover. The mapping of the burial ground was undertaken primarily in order to inform the results of the geophysical survey by providing the location of the known high resistance features relating to the recumbent grave slabs and upstanding gravestones visible above the ground. The mapping was not completed inside the chapel where the upstanding walls impeded the GPS signal. It is expected that the mapping of these areas, if needed, can be deduced from the photogrammetry and the 3D laser scanning of the chapel, none of which are part of this report.

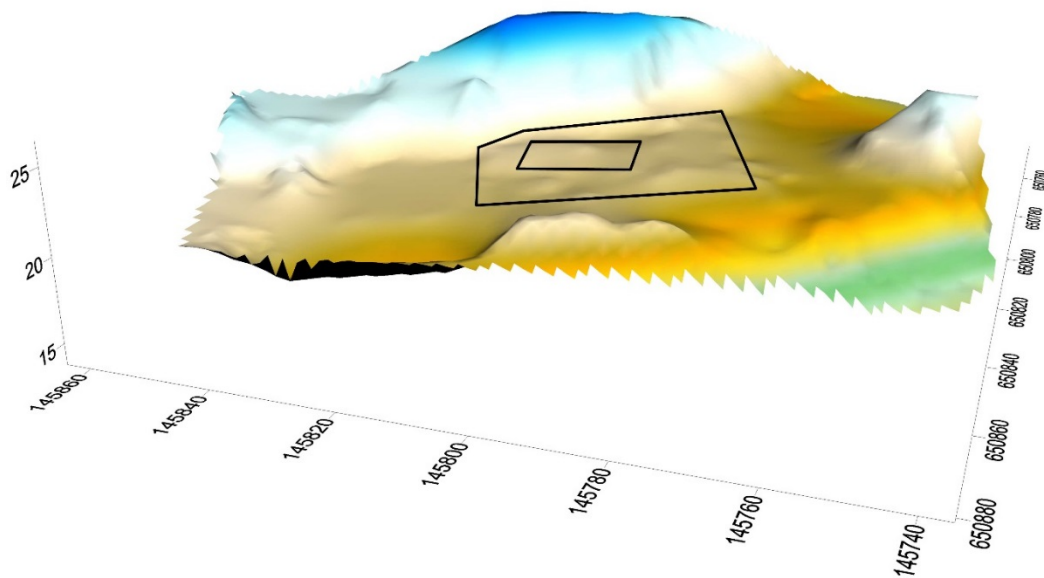
## 3. Results

### 3.1 Topographic survey and burial ground mapping

The results of the topographic survey and the plan of the burial ground are shown in Figure 2. Figure 3 contains the 3D surface model showing the location of the chapel and the burial ground in relation to the underlying topography. The chapel and the burial ground are laid out on the level ground nestled between the natural ridges and hillocks running on the SW-NE alignment in this part of Islay (Figure 1). The nearest of these ridges flanks the southeast side of the burial ground. The enclosure wall follows the break of slope at the base of the ridge. A smaller ridge immediately to the north of the enclosure and across the road from it is topped by heavily denuded and overgrown building, which is barely discernible. This structure was not surveyed, but its outline has been incorporated here from the OS data. The ground to the northeast of the enclosure has been heavily landscaped by the creation of the level car park, which is best appreciated in the 3D surface model in Figure 3. The ground drops off to the southwest and the northwest from the enclosure wall. The difference in the elevation on the two sides of the wall suggests that the northwest corner of the burial ground has been artificially build up to make up the level ground sufficient for the current extent of the enclosure. The enclosure wall here also acts as a retaining wall, projecting lower on the outside than on the inside of the enclosure. The low ground among the trees to the southwest from the burial ground is in reality very uneven, possibly as a result of human disturbance. It is also poorly drained and wet. Finally, the location of the 'Thief's Cross' can be seen in the far northeast of the survey.







*Figure 3 A 3D surface model of the terrain around the Kildalton Chapel and the burial ground showing their position in relation to the topography.*

### 3.2 Electrical resistance survey

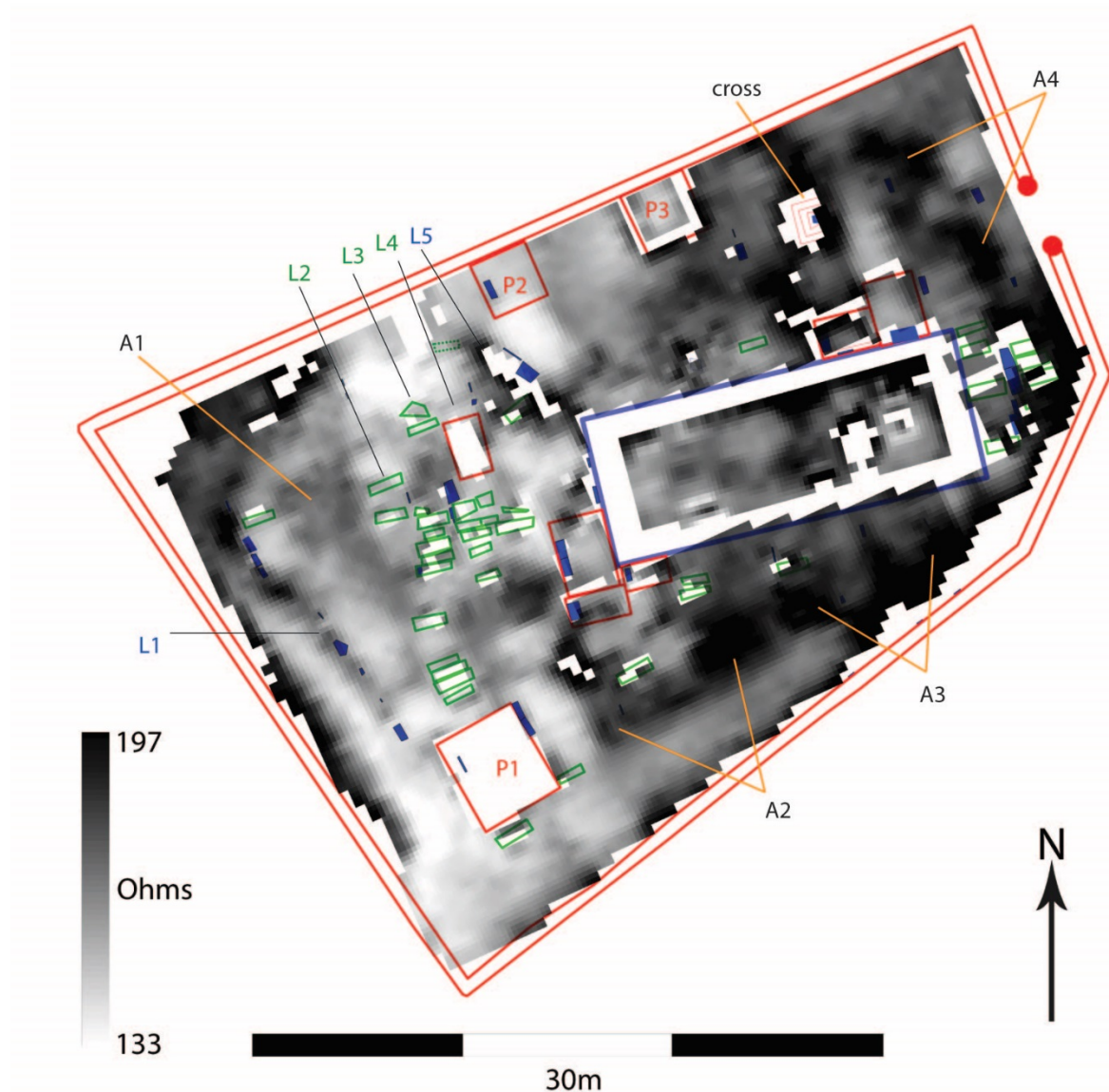
The results of the electrical resistance survey are shown in relation to the plan of the burial ground (Figure 4), which enables an objective interpretation of the busy geophysics plot. The survey results are dominated by a suit of high resistance anomalies, some of which form linear features that could be indicative of buried structures. The southwest and the northwest edges of the burial ground are characterised by extreme, off the scale, high resistance readings. This is due to the proximity of the stone enclosure wall, which projects lower than the burial ground surface on the outside of the enclosure and acts as the retaining wall. In addition the ground itself has most likely been built up, perhaps by the make-up containing rubble.

Between the southwest side of the enclosure wall and the chapel run several SE-NW and S-N orientated high and low resistance bands, which correspond well with the rows of burials (L1-L5) marked by either upstanding gravestones or recumbent stone slabs visible in the burial ground. The first of these is a SE-NW orientated high resistance linear anomaly running parallel with the enclosure wall and separated from it by a band of low resistance. This anomaly follows the line of the upstanding gravestones L1 marked in blue. This line stops at the corner of the walled burial plot P1 in the southwest corner of the burial ground. The high resistance of the burial markers is followed by the band of low resistance which presumably corresponds to the grave pits.

The next line of graves L2 is marked by the recumbent stone slabs shown in green. It is also visible in the resistance survey as a band of high and a band of low resistance. In couple of places further flat slabs, which are not visible on the surface anymore, might be suggested on the basis of the geophysics. L2 runs northwards from the walled burial plot P1 at an angle to the line of gravestones L1, which could be an interesting divergence in terms of the

chronology and the development of the burial ground. High resistance anomaly A1 sits between these lines, but does not correspond to anything visible on the surface.

Further lines of graves L2, L3 and L4 run roughly N-S and mark the area with the highest number of visible burials in this part of the burial ground. The geophysics in this area are suitably 'busy' as it would be expected from this amount of disturbance. Line of gravestones L5 changes the alignment of the burial rows once again to SE-NW. The adjacent low resistance in line with burial plot P2 is most likely related to the grave pits associated with L5.



*Figure 4 Electrical resistance plot of the Kildalton Chapel and burial ground with superimposed plan of surface features.*

The area to the south of the chapel has a sparser distribution of burials marked above the ground surface. Nevertheless, this area contains some of the largest high resistance anomalies (A2 and A3) spread out between the chapel and the enclosure wall. It is difficult

to interpret these with any certainty, but anomaly A2, in particular, appears to have straight sides to the southeast and the southwest creating a 90° corner. It is thus possible that it represents a man-made structure or multiple conjoined structures. Anomaly A3 continues the high resistance trend further to the northeast, although the situation here becomes more difficult due to the constrained space between the chapel and the enclosure wall, both of which contribute their own high resistance responses. In the northeast corner of the burial ground further high resistance anomalies A4 are conjoined yet amorphous and, hence, difficult to interpret. The area around Kildalton Cross is also marked by high resistance as it would be expected due to the construction of the base on which it now stands. Finally, the area to the north of the chapel and to the south of burial plot P3, as well as the chapel interior, contain a complex of smaller anomalies, which are consistent with multiple burials and associated structures or buried gravestones/slabs.

#### 4. Conclusions

Electrical resistance survey of the burial ground and the chapel interior has produced a complex geophysical plot, which, for this very reason, is difficult to interpret. The accompanying plan of the gravestones and the burial plots helps to elucidate some of the clearest geophysical anomalies in the area to the west of the chapel. The linear bands of high and low resistance in this area correspond very well with the distribution of the burials, representing the headstone bases and the grave pits, respectively. It is possible to suggest several instances of possible buried recumbent slabs in rows of burials L1, L2, L3 and L4, which cannot be seen on the surface. Both the geophysics and the location of recumbent stones to the south of walled burial plot P1 suggest that the burial rows continued across the full width of the burial ground prior to the insertion and the construction of P1. The misalignment between rows L1 and L2 is curious and gives some further interest to the high resistance anomaly A1, which occupies the widening space between them and could hypothetically account for the cause of this divergence either in terms of representing a possible structure or further burials, which are now concealed below the ground. Several carved stones in row L2 can be stylistically dated to the 15<sup>th</sup>/16<sup>th</sup> century (RCAHMS 1984:214, e.g. nos. 15 and 16), which gives a starting point for the chronological developments in this part of the burial ground. Additionally, as row L1 is aligned parallel to the adjacent southwest enclosure wall, it is possible that the date of the enclosure wall is not in sync with the core of the burials around the chapel.

Substantial high resistance anomalies A2 and A3 to the south of the chapel provide the best candidates for possible earlier structures. Straight-sided appearance and the high resistance of A2 is suggestive of a building, but its alignment could equally represent further burial-related features. Similarly, anomalies A3 and A4 could be a continuation of stone-built burial features around the 12<sup>th</sup> century chapel. Nevertheless, further geophysical survey with a different method, most appropriately ground-penetrating radar, would be desirable in these areas and would help to distinguish any graves, which may be masked by the general high

resistance in this area, or any possible building foundations. Any such work would require Section 42 consent from the Historic Environment Scotland for the use of magnetic survey equipment on a scheduled monument.