

## REVISITING THE OLD CITY CEMETERY: NEW DATA AND NEW INSIGHTS ON CEMETERY CHARACTERIZATION

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At SAGEEP 2021, we reported on our 2019 geophysical survey at the Old City Cemetery in Murfreesboro TN. The site has significant historical importance and had fallen into disrepair. In 2017, the Rutherford County Archaeological Society (RCAS) began a project to restore the site. Current work is a follow-on from the 2019 survey. Based on our previous results, we have acquired new data at five-selected locations, using GPR, magnetometer, and EM61. The 2021 data acquisition was intended to improve our understanding of optimal geophysical methods for cemetery surveys and focused on enhancing the detection of unmarked graves and a possible mass grave, and better definition of a large anomaly that extends through the center of the cemetery, for nearly the entire length of the site. GPR data were acquired in each of the five areas using a GSSI 4000 350MHz hyper stack antenna, generally with 1m line spacing. The GPR data provided significantly improved locations of anomalies (compared to 2019), and these are being correlated with magnetometer results. Importantly, many GPR anomalies are detected in the southern portion of the cemetery, where most of the burials are unmarked and a mass burial might be located. Magnetometer data were acquired in two of the five areas. The Foerster Ferex 4.034 magnetometer array has four vertical components magnetic gradiometers and was configured with 0.5m vertical separation between sensors and 0.25m lateral separation between the gradiometers. The lateral separation was reduced from our 2019 survey and focused on areas of particular interest in order to assess optimal parameters. Using 1m track spacing, we were able to acquire magnetometer data at 0.25m line spacing over both areas. Geonics EM61 data were acquired in three areas for comparison with the 2019 EM data acquired with the Geosensors R6 and to improve our understanding of EM tools for cemetery surveys. Results of the survey will be presented along with an assessment of the suitability of each tool for similar projects.