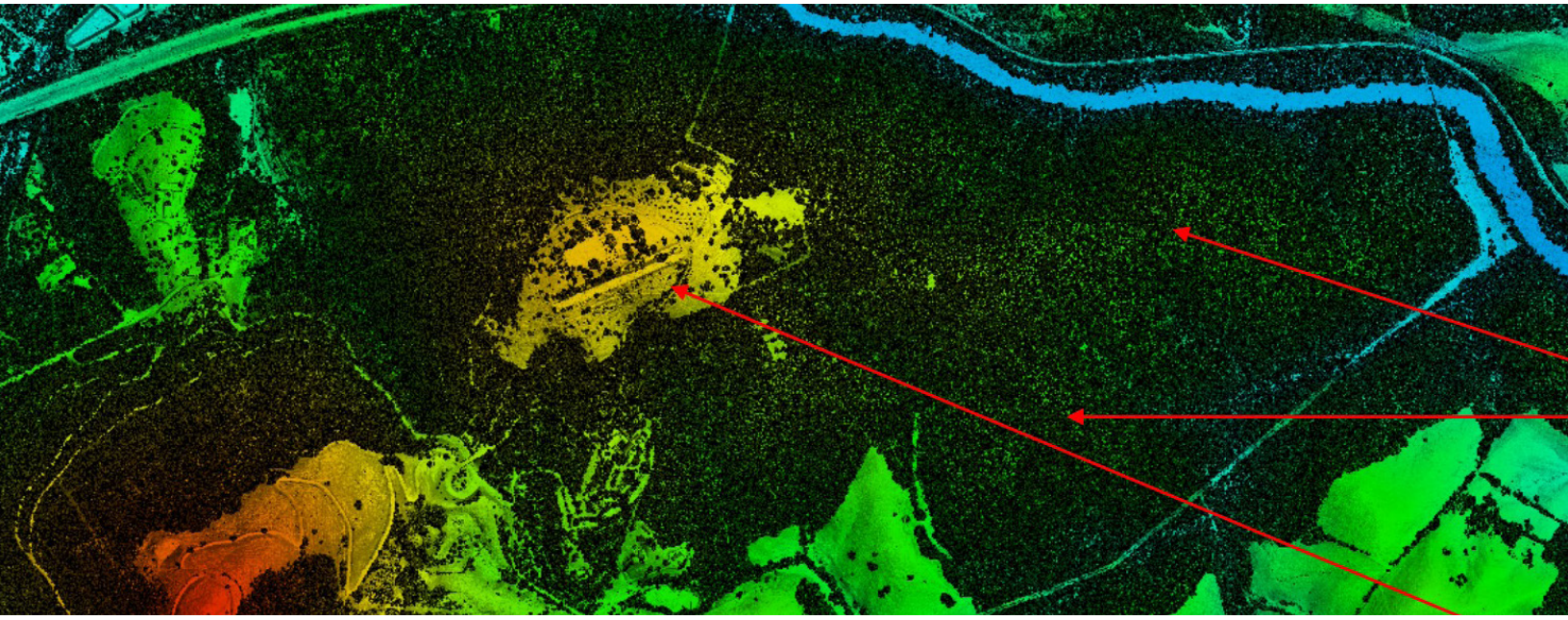
Thomas Jefferson's Monticello

Charlottesville, VA



Size

5,000 acres

Schedule

2022

Services Provided

30 ppm LiDAR

3D Laser Scanning

Description

One of our country's most important historical sites is yielding more information, thanks to modern technology. Thomas Jefferson's home, Monticello, was a working, 5,000-acre plantation that was home to Jefferson and hundreds of other people. For several decades, archeologists have been piecing together artifacts and other remnant traces of the inhabitants of the 1800s, and in recent years, the application of lidar technology has enabled them to detect subtle features on the surface of the earth and traces of past land use that heretofore were indiscernible.

In 2022, the Monticello archaeology team contracted our team to acquire 30 points per square meter (ppm) lidar of Jefferson's original 5,000-acre to identify unseen traces of past agricultural land use, including berms left by vanished fences and field boundaries, road traces, walls, long parallel ridges that mark orchards and erosion gullies carved by agricultural runoff. Identifying such features will provide the archeologists with clues for further investigation and to direct archeologists of prospective areas for excavation.

Part of the archeological jigsaw puzzle was consolidating a large variety of earlier data to assemble as complete a record as possible. This included using the lidar data in conjunction with early maps, such as early hand-drawn documents of Monticello Mountain agricultural fields dating back to 1795, a 1923 survey plat which shows property lines and ownership from 1833, and aerial photographs dating back to 1937.

The next major step was in 2016 when archeologists obtained 2 ppm lidar data over the site from the USGS. Even with this relatively low density lidar, they were able

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to identify concentrations of artifacts which revealed potential sites with a high probability of a successful excavation; these excavations included shovel test pits dug at 40-ft intervals and shovel test pits – circular holes 1-ft in diameter with the soil screened through 0.25" hardware cloth to reveal artifacts.

While the 2016 low-density lidar data enabled researchers to detect previously indiscernible details in the terrain, it did not provide the level of detail needed for more in-depth analysis, and the 2022 project with our team revealed startling additional detail. The challenge was that over several decades, much of the terrain had been completely reforested, making it difficult for lidar to penetrate the tree canopy to reach the bare earth. We acquired the data with an Optech Galaxy Prime sensor at 1,350 ft above ground level. The project required a total of 25 flight lines at 60% sidelap to ensure complete coverage.

Once processed, the 30 ppm lidar data produced significantly enhanced digital elevation models with significantly higher clarity than the 2 ppm 2016 USGS lidar. The berm and road trace lines are notably enhanced, and the rows of soil where orchards had been planted (previously undetectable) were readily visible.

The ongoing interdisciplinary study of the Monticello landscape, the artifacts that lie under it, and surviving documents are providing 21st century Americans with a much clearer understanding of the property and the lives of all its residents than we had a decade ago.