

# The Use of Remote Sensing Technologies to Perform Tree Surveys

Coleen Johnson and Scott Jones (USA)

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## SUMMARY

Trees play a vital role in the health and social well-being of humans and to support sustainable communities. Forward thinking counties and municipalities throughout the world have established tree protection ordinances creating standards and guidelines to ensure the safeguard of heritage and protected trees and to provide a balance between tree preservation, tree removal and replanting during the commercial land development process.

Geospatial experts are tasked with performing tree surveys to aid in tree preservation. In an effort to reduce the time and costs associated with performing conventional tree surveys, we developed new processes and workflows using a combination of horizontal & vertical control points, Unmanned Aerial Systems (UAS) with Light Detection and Ranging (LiDAR) sensors, and on-the-ground verification to perform tree inventory surveys for land development clients. After setting the appropriate control for the aerial data capture, we perform the UAS flight. The LiDAR sensor is adept at penetrating the thick canopies to capture ground shots in and around the tree trunks, and point data on tree branches and tops. Our proprietary tree canopy workflow utilizes LiDAR point cloud technology to filter and segment the data into distinct tree stands. The individual trees are then subjected to a series of extraction processes to calculate important metrics, including trunk diameter, canopy width, and height. The derived LiDAR data is then integrated into various geometric deliverables, such as crown height point data and tree canopy polygons, which can be conveniently compiled in an ESRI enterprise database for field validation and utilized in applications such as ArcGIS Field Maps and ArcGIS Collector. Field verification includes capturing the tree species identification, measuring and confirming the trunk diameter at breast height or 4.5 feet above ground level (or as stated in the local tree ordinance) and capturing the

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metrics needed for any irregular shaped trees and for any areas with voids in the point cloud data.

Use of these innovative technologies and processes significantly reduce the time and cost of conventional tree inventory surveys we perform for our clients within the land development, forestry and logging markets.

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