Transport Canberra and City Services maps tree canopy from aerial laser scan with FME and 1Spatial

Client:
Transport Canberra and City Services (TCCS)

Industry:
Government

Key Benefits:

▷ Expert consulting services accelerate analysis of aerial LiDAR data

▷ Accurate tree canopy maps enable more targeted management strategies

▷ Improved staff productivity and support levels with FME geospatial tool

A key focus of the ACT Government is connecting people to services. The Transport Canberra and City Services (TCCS) Directorate has a leading role in this area by integrating transport across Canberra including the construction of light rail, upgrades to the public realm including footpaths, cycle paths, street lights, parks and city places, and exploring options to improve sustainability in key areas of waste and urban forest management.

With respect to the urban forest, the relationships between climate change challenges, sustainability goals and community expectations are key drivers in the development of an urban tree planting program. Informative and current data sets are being used to inform management strategies by overlaying age, density and condition data and proposing future canopy density targets.

Baseline required for urban tree canopy

The establishment of current baseline data for Canberra's urban tree canopy coverage was essential to the program. In this respect, two data sets were available: a 2010 ground-based audit of trees in streets, verge areas, open spaces and parks; and new aerial laser scanning LiDAR (Light Detection And Ranging) data for the majority of urban areas across Canberra.

With a tight time frame of four weeks to complete the project, TCCS needed to quickly analyse and extract the LiDAR data relating to trees and combine it with the ground-based audit data. After evaluating different tools and methods, TCCS chose Safe Software's FME application and engaged 1Spatial, a Safe Software Value Added Reseller and Platinum Partner, for their expertise in analysing and extracting LiDAR data to accelerate the process.

"We were keen to use FME because we have an existing skills base," said Daniel Goodwin, Acting Manager, Asset & Data Integration for TCCS. "FME is more user friendly than other approaches which require more specialised expertise. It also provides full transparency into the process which makes it very good for iterative development. With other tools, we weren't sure we could get the outcome we wanted in the available time frame."

LiDAR analysis completed ahead of schedule

A 1Spatial consultant was contracted for two weeks to identify tree-related data points in the LiDAR dataset and generalise them to create smooth representations of the tree canopy.

> Within a week, 1Spatial had a good product output, and then we ran some refinements over the next week," said Goodwin. "We used out-of-the-box smoothing algorithms in FME to generate very compelling data for our analysis."

As 1Spatial was able to deliver ahead of schedule, the Directorate could save time and use its own FME skills more productively. This included verifying the tree canopy data, integrating it with other datasets and creating mapping tools for strategic tree planting and management.

Taking the guesswork out of tree management

When the final tree canopy data was displayed in TCCS's Geographical Information System (GIS), with canopy coverage calculated as a percentage, the value of the LiDAR data was immediately obvious.

"The LiDAR data was crucial in determining the canopy cover," said Goodwin. "Publicly available web mapping tools tend to merge urban and non-urban areas and overestimate urban tree cover. When we focussed on the urban areas we have control over, we could see which suburbs and streets have less canopy cover than others and better target our tree management strategy."

TCCS can also use the new data to facilitate implementation of the urban tree planting program and communicate with key stakeholders. An interactive web mapping tool is currently being developed to be used by urban tree planners, designers and contractors.

Future aerial laser scans to reveal actual impact

Because FME processes are transparent and repeatable, TCCS can process future LiDAR data for its tree management strategy with little or no external support.

TCCS will also consider calling on 1Spatial's geospatial expertise for other projects in the future, such as Canberra's road centreline project and prioritising asset replacement. Its relationship with 1Spatial extends beyond consulting services, with TCCS staff attending 1Spatial's FME training courses and FME World Tour events. The Directorate has also moved its FME licenses over to 1Spatial to take advantage of the company's support services.

> " The benefit of using FME is that it documents the workflow and is reusable," said Goodwin. "Thanks to 1Spatial we now have a professionally documented process that we can reuse in subsequent years. I would like this project to demonstrate the value of the LiDAR data, so we can re-assess in five years' time and see the actual impact we have had on the canopy coverage. "

Aerial imagery over Canberra urban area showing tree canopy

Audit data of trees on public land without individual trees or canopy coverage

Extracted tree canopy polygons derived from LiDAR data

Integrated audit and canopy data enables impact assessment at tree level

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