

A UNIQUE LANDSCAPE

MATTEO LUCCIO TALKS TO A LANDSCAPE DESIGNER WHO HAS FOUND A UNIQUE SELLING POINT TO DIFFERENTIATE HIMSELF FROM HIS RIVALS – MOBILE GIS AND UAVS

“I wanted to be able to offer a streamlined solution for my clients. I felt that there was a niche there, in which I would be able to use cost-effective, high-precision GNSS equipment to make it more efficient on my end and get it put on the ground the way I wanted it, per plan,” says Nathan

Schutte, a landscape designer working in southern Idaho, Utah, and northern Nevada in the United States of America.

The old-fashioned method of landscape design is to either hire a surveyor or measure distances with a tape and paint markers on the ground. However, some property owners do not want to deal with a surveyor or are too rushed to schedule one.

So Schutte decided to offer the service himself, one that would include georeferenced UAV imagery for both design and presentation to clients.





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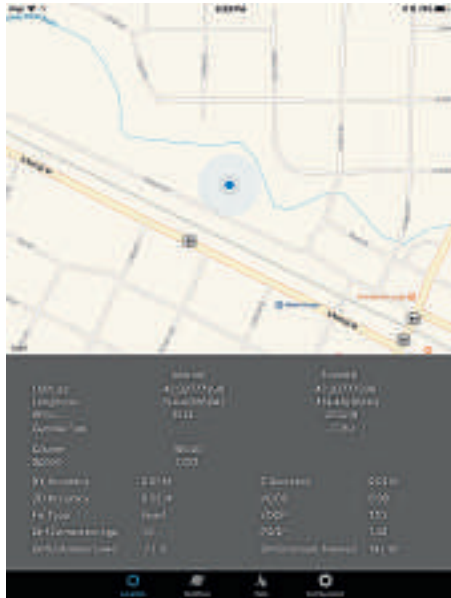
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MOBILE GIS



The SXBlue RTN when connected to the RTK network, showing centimetre accuracy

When scoping the service, Schutte wanted an inexpensive, simple to use GNSS receiver. However, cheaper systems were a challenge because they were made to work with a GIS, not AutoCAD, which he uses to design and draft his plans. He also wanted a system that he could use to set ground control points (GCPs) for his UAV imagery.



iCMTGIS Pro with the GPS receiver connected, displaying a UAV aerial photograph

top of it and connects the receiver to The Utah Reference Network (TURN) GPS. This RTK network generates real-time positioning corrections and while there are free towers he could use instead, he prefers to pay US\$600/year to use TURN because it provides better reliability and accuracy than the only two free towers in Idaho, which are often too far away.

“I get centimetre accuracy on x, y, and z. It works really well.” When he has finished setting all the targets and recording their locations, he powers down his GNSS receiver, powers up his UAV, and opens the UAV app on his iPad to set the overlap, altitude and other flight parameters. “I select the flight parameters based on my experience and the flight conditions on that day, but basically the app does most of the calculating for image overlap and flight speed,” says Schutte.

He makes sure that his flight plan covers all his GCPs. Once he is done setting the mission, the UAV will fly it and all the GCPs will be in the imagery it collects. To collect the imagery, he equips the UAV with a 20MP camera with a mechanical shutter capable of shooting 4K video.

Once the UAV gets back, he puts it away, returns to his office, inserts the flash drive from the UAV into his computer and downloads the imagery. Then, he connects his iPad Mini to his desktop computer and uses a program called Syncios to transfer the data from the iPad to his Windows desktop.

“In iCMTGIS Pro,” Schutte explains, “I export the coordinates of those GCPs collected by the SXBlue receiver as a DXF file and as an Excel file in my local state plane coordinate system. That gives me all the coordinates and the elevation. That way, I can import the DXF file into my AutoCAD software and I also have the coordinates in an Excel file that I can easily import into my UAV image processing software. There, I select the GCP in the imagery and provide the collected coordinates. This process allows the software to optimise the imagery with the actual coordinates collected on the ground.”

Next, Schutte uploads the images into his image processing software, selects his GCPs in the images, matches them with the coordinates from the Excel

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A dealer recommended Geneq’s SXBlue Platinum RTK GNSS receiver and the iCMTGIS Pro software for iOS, which would enable him to interface with AutoCAD. Now, he uses them in the field to mark and set GCPs to accurately reference his UAV data and the UAV orthophotos and other GNSS data provide an ideal basemap of existing conditions from which to develop his landscape designs.

Workflow

Typically, Schutte’s clients need a base map – for example, to remodel their house or their property – but don’t have a recent survey. “So, I am starting from scratch,” he says. “I start by producing the base map, which is a high quality orthophoto. Then I will get topography, to figure out where everything is draining, and work out a grading and draining plan.”

He arrives at a site with his GNSS receiver and his UAV, and starts by setting four to eight GCPs. The number and location of his GCPs depends on the size of the site, but typically he places one at each corner and one in the middle.

To set each target on the ground, he places his SXBlue receiver on a tripod on

“It is the same network that the Utah and Idaho departments of transportation use,” he says.



An example of NS Consulting’s base map deliverable

file, and processes the imagery to those coordinates and elevation data. The result is an accurate orthophoto, contours within 3cm and elevation point clouds. He is now ready to design his landscape.

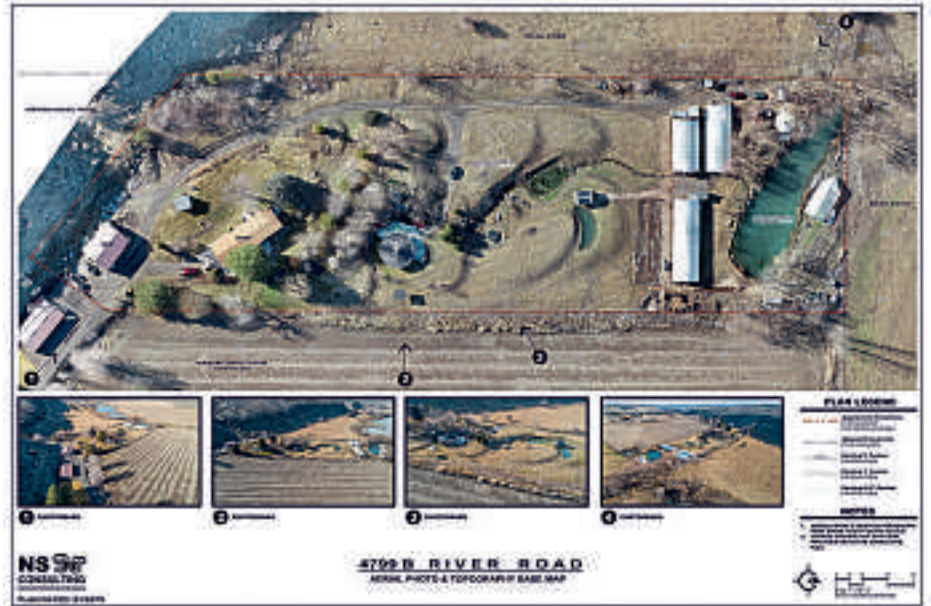
Deliverables

This process allows Schutte to produce a base map that reflects existing conditions. Additionally, while flying the UAV to take the orthophotos, he also takes some regular isometric pictures from around the property to put on the plan as well.

When he first meets clients after producing the base map, he shows them a plan based on the orthophotos. "Then, if we are doing a remodel, if I can get any architectural plans from the client or from the builder, I will put those in as well," he says. "So, you see the floor plan with the image of the house and you see where the windows and doors are."

Next, Schutte obtains the property boundaries from the county GIS. If the property boundary was recently surveyed, he gets the data from the surveyor and includes that, too. "So, my base map contains the orthophotos – which show walkways, driveways, existing trees, utilities, whatever is there and visible from the air – together with the floor plan and preliminary property boundaries," he says.

Sometimes, he can locate the property's pins and will use his GNSS receiver to collect



their locations and include them in his deliverables. His finished product includes a base map, the orthophotos, a few isometric images and topography with 30cm contours. "Then, from there, I put on my landscape architect design hat and roll that into the preliminary landscape and grading plan."

A UAV USP

The ability to encompass the project and provide a service from start to finish has been a real advantage that puts him ahead of his competition.

"The accuracy provided by the GPS receiver, in conjunction with the high-resolution imagery from the UAV, produces a mapping solution that no other landscape architect in my area uses," he says. "When my clients see the clarity and high quality of the product, they get a renewed excitement about the proposed design and really look forward to completing the plan."

Matteo Luccio is the president of Pale Blue Dot (www.palebluedotllc.com)

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