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OVERCOMING FROM ABOVE

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With only 18 per cent of the country's population living in urban centres, Papua New Guinea is one of the world's most rural and unexplored countries. Dense with rainforest and other diverse ecological features, terrain is a constant obstacle for surveyors. Restricting access to key areas, measurement professionals must find innovative means to gather needed data.

When Benchmark Survey & Design, a survey firm in North Queensland, Australia, was contracted by the Porgera Mine Survey Team to map spill grounds around the secluded mine located at the head of the Porgera Valley in highlands at an altitude of 2,200 to 2,700 metres, the firm specialising in topographic site surveys knew it needed to find a new method of surveying. As the captured data would be used to environmentally monitor the dump sites of the spill generated by the mine, accuracy was of the utmost importance.

MAPPING DANGEROUS TERRAIN WITH AN UAV

In an area where landslides and earthquakes are common and with only five days available to map, Benchmark Survey & Design determined a survey by air would be the safest and quickest survey method. The firm turned to Spatial Technologies, an Australian firm with more than 20 years in GIS, to provide an UAV pilot. Flying the Aibotix Aibot X6 UAV and collecting data in various environments for the past two years, Spatial Technologies was up for the challenge.

With two sites to capture around the mine, Anjolek at 380 hectares and Anawe at 250 ha, the pilot, Anton van Wyk, had to carefully plan his route. Facing several challenges, such as much of the terrain only accessible by helicopter, use of the helicopter only available one out of the five days to map, and extreme weather with fog in the mornings and rain in the afternoon leaving only a few hours each day to survey, van Wyk's precise plan rested upon the durability and dependability of the Aibot X6.

"The Aibot X6 provided better results than what Porgera Mine Survey Team expected, even in such rough terrain," said Wayne Storey from Benchmark Survey & Design. "Though the mine survey team had someone prior fly this mission, the team didn't receive the expert mapping and processing of the data the Aibot X6 delivered with its more advanced sensors."

With 32 total flights at about 10 minutes each, Spatial Technologies collected 9,100 orthophotos at a 5 cm ground sampling distance. While Benchmark Survey & Design only need sub-metre accuracy for the project, Spatial Technologies was actually able to supply 10-20 cm accuracy with strategically placed controls in conjunction with the RTK on the Aibot X6. The entire project was processed in about 96 hours to provide visual documentation of volume changes in the spill grounds.

MORE THAN JUST VOLUMES

Combining the orthophotos from the Aibot X6 with older data and point clouds of the site created by laser scanning technology, engineers and environmentalists on the project were able to go beyond just volume calculations. Together with the many forms of data collected, they can now see visible proof of vegetation changes and conduct slope analyses.

As the dangerous terrain evokes risky conditions for surveyors, measurements were previously being taken few and far between. With the safer and quicker UAV survey, the mine survey team can now monitor on a more regular basis to manage issues sooner and rectify problems before they become major concerns.

"Aerial surveys with the Aibot X6 can not only be done quicker than traditional methods, but with the advanced sensors it can carry, we can gain the same if not better accuracy, as well," said van Wyk. "Since surveyors don't have to enter risky areas to set up instruments, the UAV also makes our jobs safer."

When terrain creates obstacles on the ground, UAVs are able to overcome from above. Opening access to more and more areas, the Aibot X6 is creating new opportunities across the globe.

