

Safe, Precise, Fast – How Drones are Modernising Rock-mapping

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Exceedingly fast, highly cost-effective and capable of gathering ultra-detailed data, the use of drones to perform what was once a hugely hazardous manual exercise has revolutionised rock-mapping. The innovative approach was formed to tackle challenges faced in the New Zealand's post-earthquakes remediation projects.

To safely enable construction work underneath the damaged 80m high cliff and on the surrounding unstable land, the project team engineered unique, cutting-edge smart technology.



Combining laser scanning of the cliff and use of drones with photogrammetry techniques provided the inputs to the new Digital Rock Mapping tool.

Not only did drone-mapping capture vast amounts of information very quickly, extracted data was transformed into highly accurate three-dimensional models using sophisticated software. The innovative Digital Rock Mapping tool then extracted the information required to undertake stability analysis, directly from the digital model. The new approach completely negated the safety risks involved in manually assessing the unstable cliff face and landslide.

The first of its kind to be used in New Zealand, the team's innovative deployment of UAVs enabled remote mapping of the cliff face and evaluated ground volume changes that provided valuable data on:

- 1) Safety and work planning - using virtual reality (VR) headsets to view models meant that both onsite personnel and remotely located personnel could accurately visualise the project's progress. Work planning was conducted via the use of latest in AR technology, allowing the team to discuss health and safety implications.
- 2) Volume measurement – By comparing the digital models over time, the team was able to accurately manage safety from loose blocks in the cliff and calculate the volume of material removed from the landslide against earthmoving contractor estimates.

