

Utilization of Remotely Piloted Aircraft (RPA) in supplementing slope stability assessments

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The use of Remotely Piloted Aircraft (RPA) or Unmanned Aerial Vehicle (UAV) for fast and low-cost data acquisition has been rapidly emerging for the past decade. Most widely used applications of RPA for civilian purposes include photogrammetry and remote sensing, 3D modelling, disaster response and monitoring, and agricultural and geological investigations.

Cardno has experimented with the integration of RPA for photogrammetry and 3D modelling to assist geotechnical risk assessment works at several project sites. Investigations and surveys conducted via RPA are utilized alongside traditional on-site slope assessment methods as an innovative approach in geotechnical data acquisition and design of remedial measures. Oblique photography assessments, which entails acquisition of oblique images using multi-rotor RPA for steep areas, are used to produce high resolution orthophotography and 3D models. The resulting aerial imagery and model can then be interrogated to identify potential hazards which are not noted during visual inspection or where large areas are required to be examined efficiently. This also provides an alternative avenue of investigation on inaccessible or potentially hazardous areas without compromising the safety of personnel.

This paper highlights the potential use of RPA in the field of engineering geology and geotechnics and how this can provide innovative means to improve and supplement traditional site-based assessment works. Remote inspection also leverages the safety capabilities of RPA to enable high quality data acquisition on areas where traditional methods are unfeasible. The use of RPA on other relevant assessments to provide imagery and mapping means (rock fall assessment) and rehabilitation works (mining) are also discussed.

Keywords: geohazards, risk assessment, GIS, photogrammetry, 3D modelling