Validation of landform evolution modelling using remote sensed erosion data

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# ABSTRACT

A key requirement for landform closure design is to characterise the long-term erosion risk. Landform evolution modelling (LEM) is often conducted prior to landform construction to predict erosion impacts over extended time periods. Increasingly, regulatory authorities require LEM to predict post-closure erosion performance of landforms during the project approvals phase. The purpose of this presentation is to investigate the predictive accuracy of LEM on a mining landform in comparison to observed erosion at a Goldfields mine, in Western Australia (WA).

Due to the development of modern survey hardware, including unmanned aerial vehicles (UAV) and high-resolution mounted surveying sensors, high-resolution surveys of rehabilitated landforms can be readily undertaken. This case study takes advantage of UAV captured LiDAR data that was collected to conduct landform-scale erosion monitoring and classified to filter out vegetation. This data was used to measure the geometry of erosion features including length, depth, slope and volume at the landform scale.

LEM was used to predict erosion on a reconstructed as-built model of the landform. Initially, the LEM was parameterised using only information available for the greenfield project such as geological information, analogue conditions, climate, local soils, landscapes and vegetation data. This represents a scenario that might be common for the approval stage of a Project. The LEM was run to match the duration of the current rehabilitation age to enable comparison of the predicted and actual erosion. The LEM was then re-calibrated using measured erosion geometries and rerun to assess predicted and measured erosion over a 300-year timeframe.

Conclusions from this study will demonstrate methods to use LiDAR data to assess the scale of erosion features and discuss the effectiveness of LEM at predicting erosion in multiple project stages and assess long term risk.