

# Application of multi-source UAV data to assess revegetation efforts on waste rock.

Tim Whiteside<sup>1</sup>, Renee Bartolo<sup>1</sup>

<sup>1</sup>Supervising Scientist Branch, Department of the Environment and Energy, PO Box 461, Darwin NT, 0801, tim.whiteside@environment.gov.au

**Keywords:** minesite revegetation, multi-source data, monitoring

## **Abstract:**

The trial landform (TLF) at the Ranger uranium mine in the monsoonal tropics of the Northern Territory was established to provide data on the long term behaviour of a waste rock landscape in order to inform the impending mine closure. One of the main functions of the TLF was to trial the establishment of vegetation on the waste rock. The TLF now has plots with woody vegetation cover that are over 8 years old. Plants are at an age and size where they should be resilient to low intensity fires and are also beginning to draw heavily on plant available water in the waste rock.

We have established a UAV-based monitoring program on the TLF to determine the ecosystem establishment and sustainability, including plant level measurements of woody cover, structure and growth rates and plant health across the entire site. To date, six missions have been conducted over the TLF capturing 5 band multispectral imagery at sub decimetre resolution using both fixed-wing and multirotor platforms. The images captured were processed using commercially available photogrammetric software to produce orthophotomosaics, reflectance maps and surface models. These products provide data showing changes on the TLF resulting from phenology and management practices over a twelve month period.

The use of photogrammetric data to retrieve structural information from revegetation sites has been problematic. Strong winds, canopy and leaf architecture impact point matching algorithms leading to trees being poorly depicted or omitted from Structure from Motion surface models. To obtain more reliable structural information, a UAV-based LiDAR system has been employed to gather data which are turned into point clouds. Hyperspectral data were acquired, to aid in species identification and plant health. Techniques developed within this program will be applicable to monitoring of the entire mine site post closure.