

CASE STUDY

EMERGENCY RESPONSE CAPTURE

PROBLEM

Outline was contacted with an urgent imagery request to fly over and capture a peak flood event threatening a regional community in remote Northern Territory. This event was due to eventuate less than 48 hours from the first contact with the client requiring a fast turnaround time and image capture within a very specific time window.

SOLUTION

Outline received the request late on a Friday evening and immediately began mobilising to execute the captures estimated to occur a day later.

Within 24 hours a flight plan had been drafted and approved, a local certified plane procured, and pilots flown from Perth to Darwin with a GTech™ 1500 camera in hand, ready to capture the flood peak during the specified time window.

The original intention was to capture at a height of 9,000ft but this had to be revised mid-flight to accommodate persistent low cloud over the target area. The flexibility and dynamic response of the Outline team meant that the flood levels were successfully recorded from 2,500 feet.



OUTCOME

Outline successfully captured 100km² of RGB imagery at 3cm Ground Sampling Distance (GSD) whilst navigating challenging environmental conditions.

Successful capture of high-priority flooding areas.

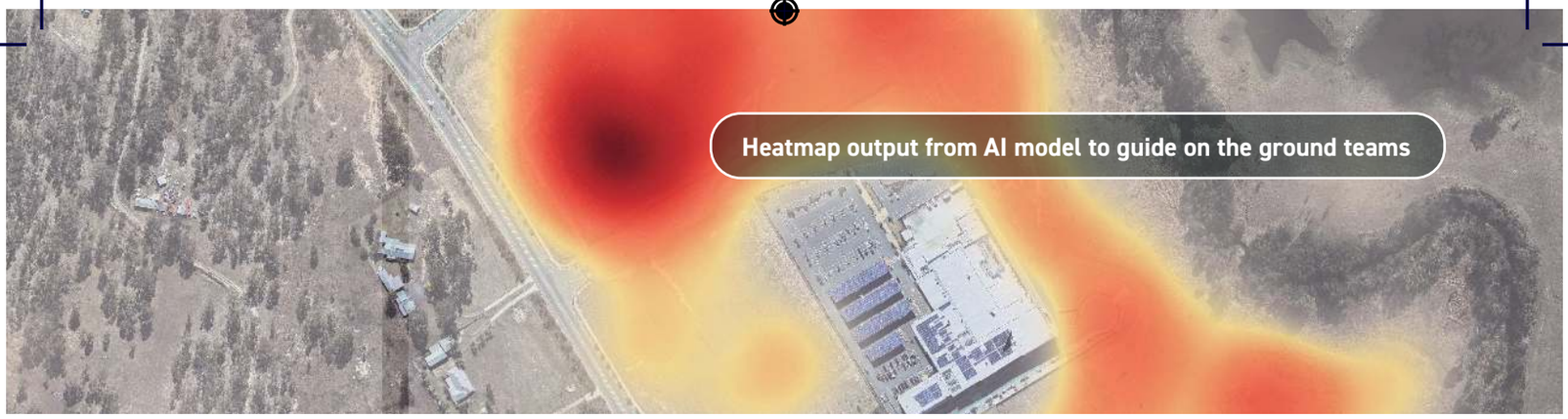
A high quality mosaic data set was delivered to the client within days of the initial request, which will contribute to provide valuable insights into flood behaviour and future planning.

Technology Used: GTech 1500

Outline IMAGERY AI

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CASE STUDY

BIOSECURITY QUEENSLAND FIRE ANT SURVEILLANCE

PROBLEM

Red Imported Fire Ants (RIFA) are one of the most invasive species to reach Australian shores posing a significant risk to the natural ecology since they were first detected in 2001. RIFA have the potential to cause more damage to the natural ecology than other known pests such as foxes, wild dogs and cats, camels, rabbits, and cane toads combined. RIFA has cost billions of dollars to other economies, hence the need to act fast in Australia. On-ground human and canine teams are used to locate and eradicate RIFA nests. However, these teams are resource-intensive and difficult to scale across large areas of land. Therefore, Outline sought to investigate and develop a remote sensing solution using aerial imagery and AI-generated insights to complement existing in-field surveillance efforts.

SOLUTION



Outline, in conjunction with Biosecurity Queensland, launched a pilot program using aerial remote sensing techniques to identify RIFA nest locations. A field investigation spanning thousands of hectares was conducted, identifying a unique heat marker that could be used to establish the location of the RIFA nests. Traditional thermal cameras have been tested before on this heat marker. However, these systems generated too many false positives due to the proximity of other infield features generating similar signals. To overcome this, Outline developed a custom GTech™ 7-band camera system that captured complimentary data inputs to enable an AI model to differentiate between noise and the true heat marker from the RIFA nests.

These AI predictions were verified by on-the-ground teams with feedback fed back into the model for training purposes. This combined effort created a strong feedback loop to continually improve the model, delivering commercially acceptable results in less than two years.

OUTCOME

A world-first ultra-high resolution multi-spectral and thermal aerial surveillance camera system was developed, in addition to an advanced geospatial AI model.

Outline was successfully able to detect the locations of RIFA nests with confidence, over a significant geographic area of 13,000ha, scaling up to 50,000ha in 2021.

Following this project, Outline won the Asia Pacific Award for Spatial Excellence 2020, which acknowledges innovation and excellence in the Surveying and Spatial industry.

Technology Used:

GTech Solenoptix | Outline AI

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CASE STUDY

MINING DISTURBANCE MAPPING & ANALYSIS

PROBLEM

Per the Mining Rehabilitation Fund (MRF) Act of 2012, disturbances must be reported annually by Mining Companies in Western Australia and inputted into the MRF reporting system. These inputs are summarised by tenement per their respective disturbance category.

Outline was asked to assist with geospatial consulting services to provide efficient and effective compliance reporting and environmental monitoring.

SOLUTION



Outline developed processes to identify, map, and monitor land disturbances and any changes in areas of rehabilitation. This process begins with high-resolution imagery to detect changes in disturbances using a combination of human and AI-based methods. The process monitors and reports changes in disturbance and rehabilitation which are classified and summarised according to defined MRF categories. Using Outline's GTech™ technology, specific capture windows and repeatable flight plans were targeted to enable like for like comparisons with historical captures.

Outline also developed custom Geographic Information System (GIS) tools to automate analysis and deliver the summary tables required by the client for the annual report. This analysis highlights how quality images, together with human consultation and AI inputs can be used to simplify and speed up accurate reporting.

OUTCOME

Annually updated (over 7 consecutive years) high-resolution RGB and NIR imagery, within a capture window producing an accurate historical overlay of the images.

Optional elevation data used for on-site planning, volume calculations, and stockpile monitoring.

Accurate current and historical spatial records of disturbance areas and rehabilitation. Results presented in spatial and tabular format.

High-level confidence from customers, due to accurate and consistent reports of annual disturbances.

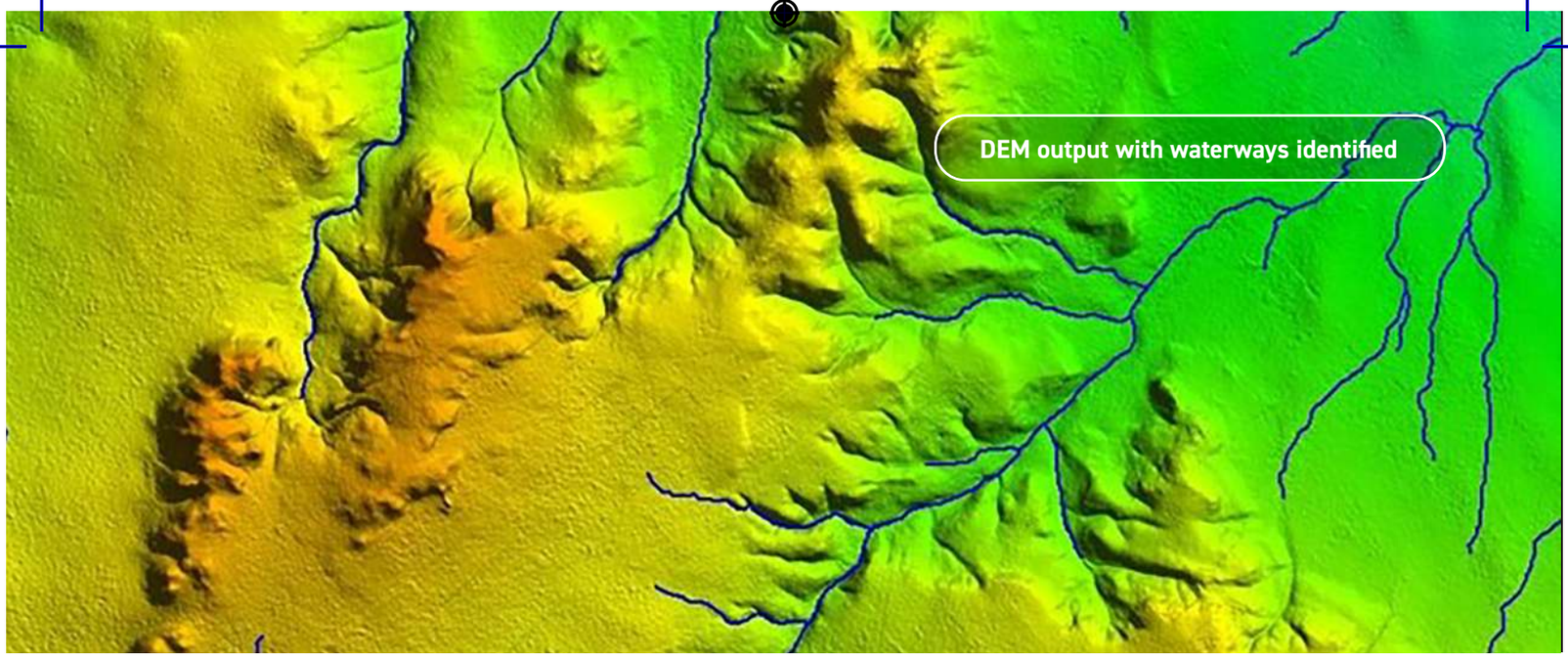
Technology Used:

GTech 1500 GTech 2800 GMap

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CASE STUDY

MINING – 4-BAND IMAGERY AND ELEVATION DATA

PROBLEM

Engineering consultants required a detailed elevation model to accurately model the direction of water flow and water accumulation within the catchment area. This information is essential for mine and road planning.

SOLUTION

Outline captured 10cm resolution stereo Red Green Blue (RGB) imagery, with 70% forward and 40% side overlap. This stereo imagery was used to produce a photogrammetrically derived Digital Elevation Model (DEM), for catchment flood modelling and other uses such as stockpile and earthworks calculations.



OUTCOME

Dedicated capture for a remote mine site in Western Australia.

Quality high-resolution imagery and a detailed DEM delivered.

Outline mapped the entire catchment area overlaying modelled rivers and streams on a map.

This was a more cost-effective approach to hydrological modelling compared with more expensive LiDAR derived surface models.

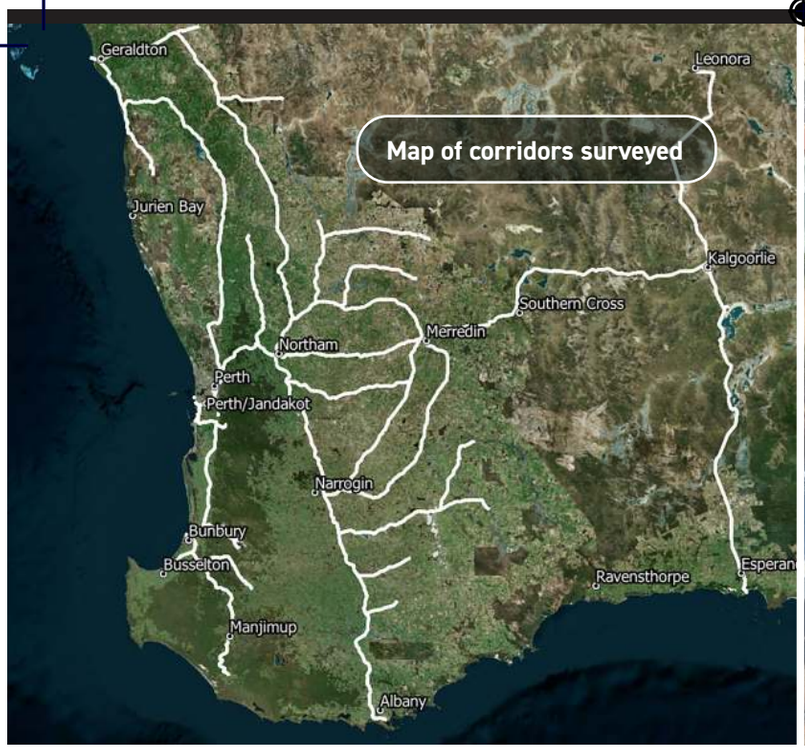
Technology Used:

GTech 1500 GTech 2800 | Digital Elevation Model

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CASE STUDY

CORRIDOR MONITORING AND MAPPING

PROBLEM

The planning and asset management process for over 5,500km of widely dispersed rail assets in WA required updated high-resolution ortho rectified maps. Outline was approached to map these areas over a short period in unfavourable winter flying conditions.

SOLUTION

Two GTech™ camera systems were simultaneously deployed to capture data along railway corridors spread between Geraldton to Esperance; a total length of more than 5,500km. The image acquisition took 130 aerial survey hours to capture and 1,200 person-hours to process.

All imagery would be ready for use in Geographic Information System (GIS) and asset management systems, within five months.



OUTCOME

100% of targets were captured by the camera systems, including several areas with low winter sun angles and other logistical difficulties. The imagery produced by these systems was of high quality, despite the many challenges faced.

Our customer maintained a high level of confidence in the project delivery due to accurate and consistent reporting throughout the project

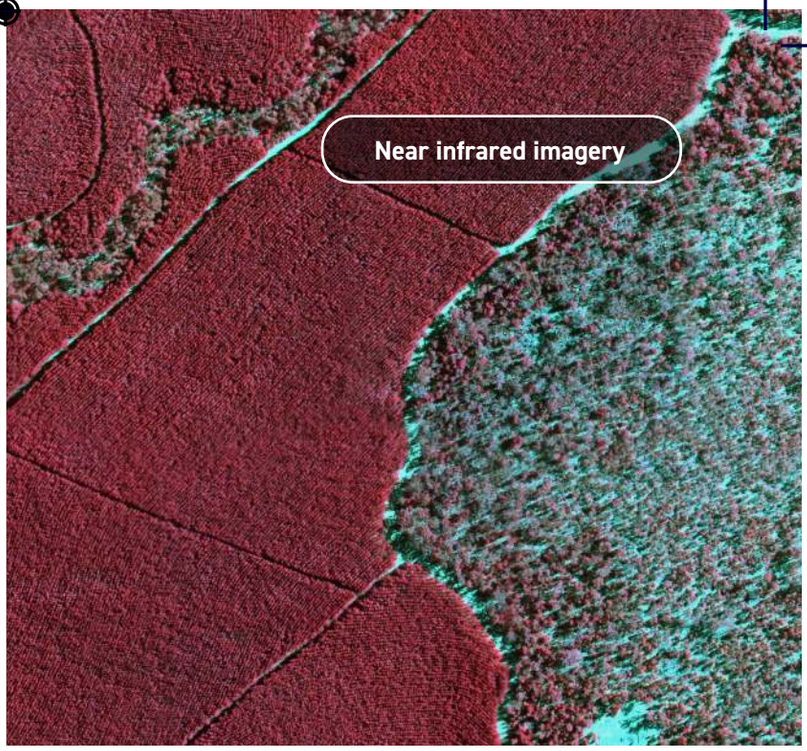
Technology Used: GTech 1500

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CASE STUDY

FOREST GROWTH POTENTIAL MAPPING

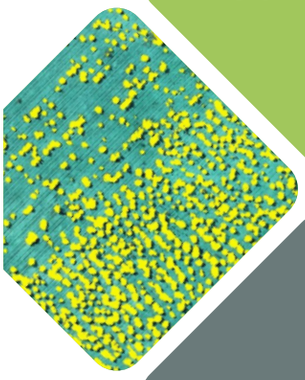
PROBLEM

Accurate mapping of forest growth potential across tree plantations for carbon accounting. This mapping and imagery was sought across widely differing growing regions and included areas of full tree cover and some with little or no forest cover.

SOLUTION

Outline used 10cm-resolution Red Green Blue (RGB) and Near-InfraRed (NIR) imagery to produce detailed Digital Surface Models (DSM) and Canopy Height Models (CHM). DSMs are obtained by first producing Digital Elevation Models (DEM), from which trees, buildings, and surface-level objects are filtered away leaving a bare ground model.

Following the production of the DSMs and CHMs, the Canopy Growth potential was then assessed, using a combination of canopy tree height, canopy cover, Normalised Difference Vegetation Index (NDVI) output, and tree stem count data.



OUTCOME

Quality high-resolution imagery was delivered on time.

Calculated forest cover percentages for differing degrees of tree cover.

Delivered spatial overview of growth patterns across plantations, with accurate and consistent spatial reports produced included.

Technology Used: GTech 2800

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