Railway Level Crossing - Orthorectified Imagery and Digital Surface Model Using Drone

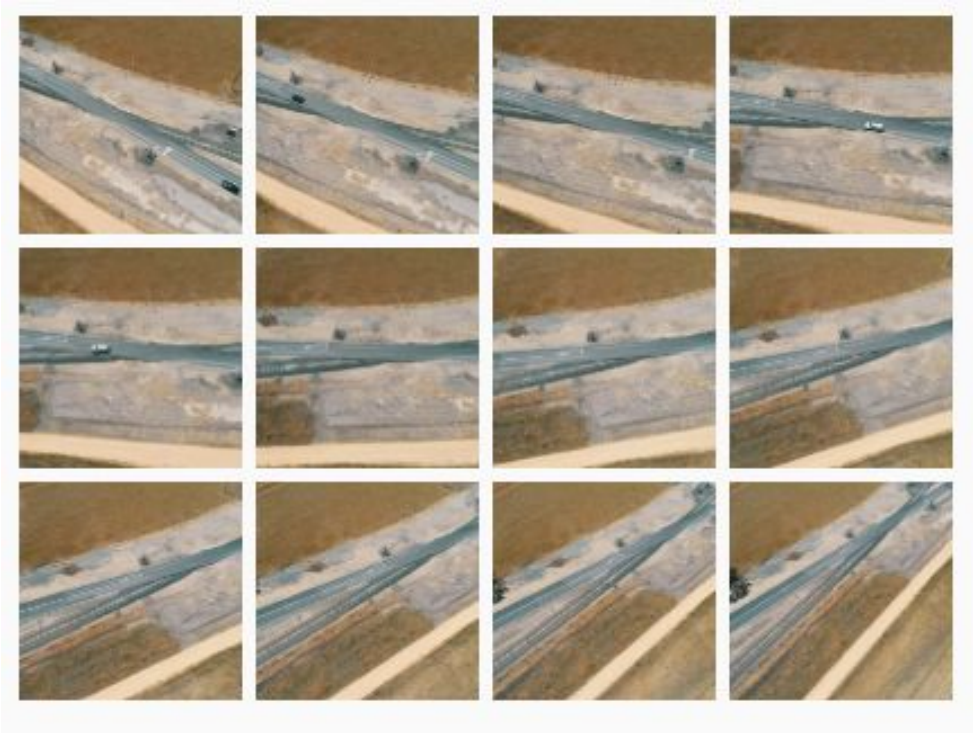
Scope : Orthoimage and Digital Surface Model of Rail-Road Crossing
Client : Internal
Area : 3.69 Hectare (~9 acres)
RPA used : Rotary wing, Phantom 4 Pro
Flying mode : Auto Pilot
Altitude : 60 m
Flying time : 12 minutes (Vs 3 to 4 hours, if foot surveyed by surveyor)
Images taken : 189
Software used : Pix4d and Drone Deploy (Two methods for accuracy comparison).

Airspace Compliance : Mission was carried out in accordance with Australian civil aviation regulator CASA`s standard operating conditions.

Methodology :

1. Flight plan for autonomous flying was carried out on desktop, before visiting the site. Sufficient care has been taken to pre-identify take-off and landing spot around 100m away from track. Flying altitude of 60 m chosen based on our past experience which we consider as optimum altitude for best results and operational effectiveness.

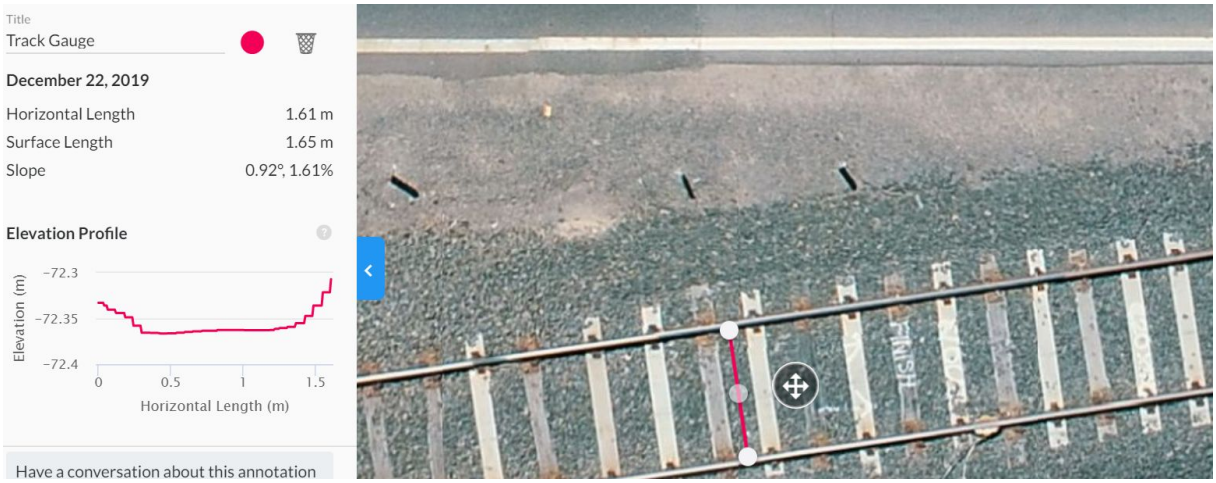
2. Pre- Processed Images - Drone acquired a total of 189 images in around 12 minutes time.



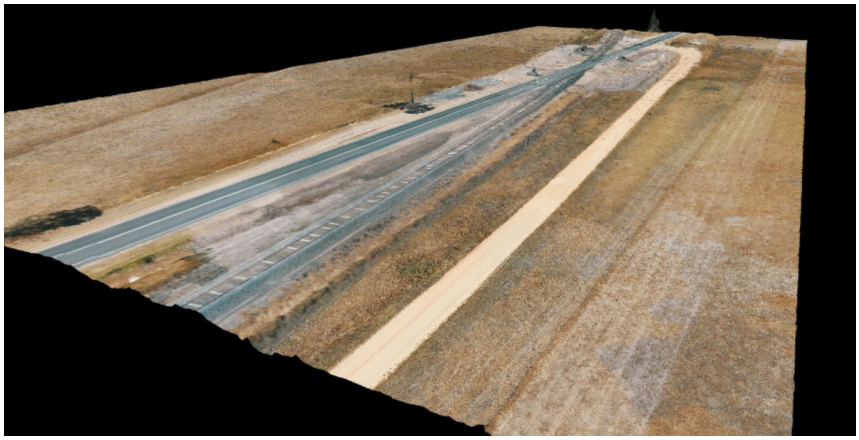
3. Orthorectified map - All images are stitched and orthorectified using dronedeploy and Pix4D platforms.

4. Area and Volume Calculation

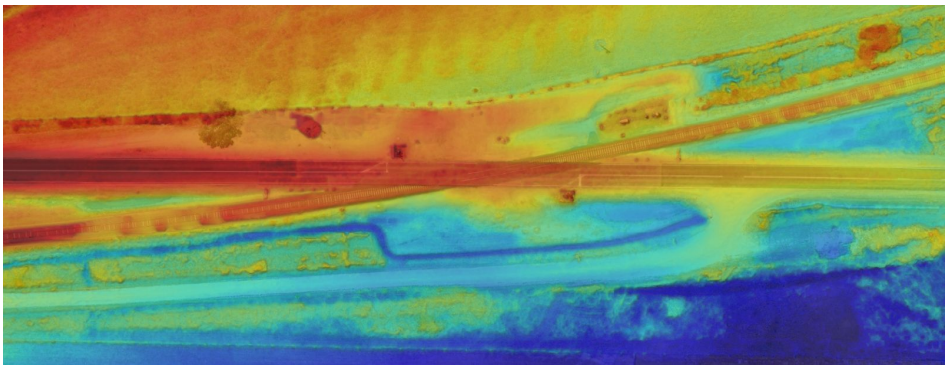
5. Linear Measurements of Track Gauge - 1.6 m Vs 1.61 m (Measured)



6. Digital Surface Model



7. Elevation Map (Showing gradient)



Conclusion : Drones mapping of rail corridors has emerged as a reliable and faster alternative to ground based surveying and mapping which can be expensive and time consuming. Orthorectified images are geometrically corrected so the scale is uniform throughout the digital image hence allows linear and volumetric measurement on computer screens without site visits.

In contrast to ground survey, drone mapping output is a Digital surface model (DSM), allows us to work with terrain in a digital environment and opens up a lot of new possibilities to visualize every nook and corner of the whole terrain. Elevation map allows gradient visualization to the minutest level.

With use of Real Time Kinematics (RTK) and Ground Control Points (GCP), sub-centimeter accuracies can be achieved however as rail corridors have rail tracks and gauge is always known, at any given time the accuracy of the map can be verified by measuring the track gauge.

Drones are easy to deploy and can be flown in a pre-programmed path without being close to the rail tracks hence track safety risk is reduced or completely eliminated.

About Yarra Drones: We are Melbourne, Australia based Drone (RPA) Services and Solutions start-up driven by strong believe that drones provide true 360 degrees of freedom with endless automation possibilities and when clubbed with digital technologies such as image analytics and AI, offers opportunity to do things differently than ever done before in much faster and safer way.