

**BHP's Pilbara-based Western Australia Iron Ore (WAIO) operations is an integrated system of four processing hubs and five mining hubs connected by more than 1000km of rail and port infrastructure.**

In 2019 BHP's WAIO began implementing TytonAI remote sensing across its mining, processing and transport infrastructure sites to assess rehabilitation performance.

Today this technology covers WAIO's Jimblebar, Newman Operations, Yandi, Mining Area C, South Flank, Port Hedland port operations, Chichester Diversion (rail) and Goldsworthy Northern Areas, the latter where mining has now ceased.

The total area of rehabilitation currently under remote sensing surveillance using TytonAI is 5,260ha.

Closure and rehabilitation is a key pillar of BHP's overall strategy to responsibly manage its asset portfolio – the WAIO component of which generated a production record of 287Mt worth more than US\$25 billion in FY2024.



“Anytime we're reviewing procedures and looking at how we carry out work, in the front of our mind is, how can AI help us?”

We need to start including this technology in pretty much everything that we do with regard to monitoring.

TytonAI is a benefit to safety and also allows us to cover more locations and monitor larger areas.

The old way of getting out in the field and taking on ground monitoring has still got an important role to play, but AI machine learning is fast becoming a way to boost productivity.”

**Andrew Blackburn**  
BHP WAIO Progressive Closure Lead

## The challenge

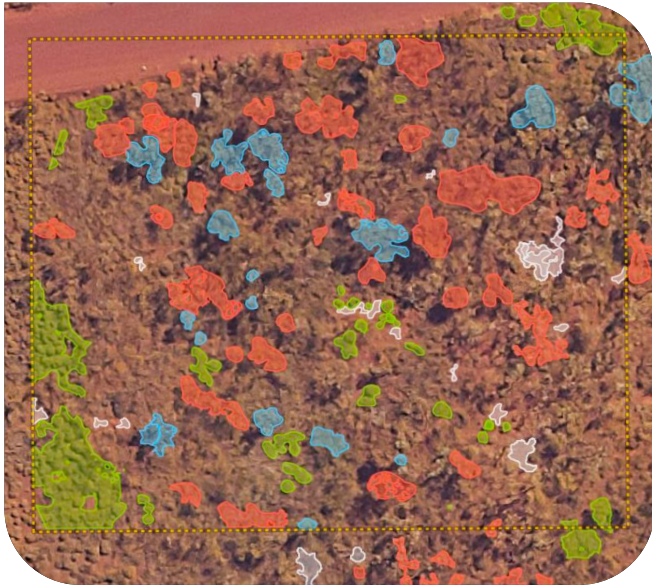
BHP's conventional on-ground monitoring was reliant on large teams needing to spend extended periods in the field to obtain data.

On-ground monitoring also only captured small sample areas, meaning data collected wasn't representative of entire project areas and didn't reflect rehabilitation progress at landscape scale.

Additionally, the growing extent of BHP's WAIO operational asset base meant there was a need to cover more ground with improved efficiency.

BHP began with a scoping study that trialed TytonAI to determine how new technology – specifically machine learning – could provide an alternative to having boots on the ground to conduct environmental monitoring and surveillance.

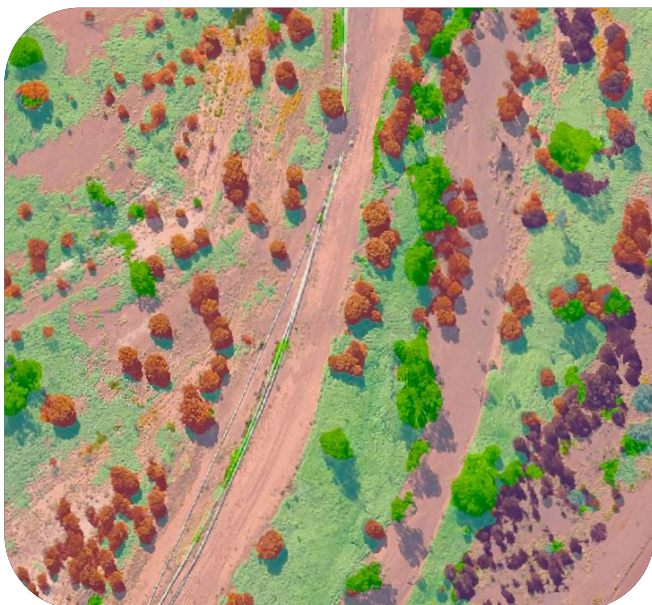




## The solution

The TytonAI model was trained to detect vegetation lifeforms (trees, shrubs, grasses, herbs and sedges) and species of interest in aerial data, and confirmed by an extensive ground-truthing program.

An integrated monitoring methodology, combining whole-of-site TytonAI assessment with targeted, data driven on-ground monitoring was implemented.



## The results

Using the integrated monitoring approach across BHP WAIO sites allowed environmental and closure teams to:

- Provide whole-of-site rehabilitation monitoring analyses of vegetation composition and structure, including key indicator species (e.g. Triodia hummock grass and mulga).
- Quantify change through year-on-year assessments.
- Adopt a data-driven approach to site inspections, reducing the requirement for large teams operating on the ground.
- Eliminate observer and sampling error, visualise trends and trajectories, and enable data-driven decision making.
- Commence collation and analysis of data to identify rehabilitation trends, or areas of concern that require intervention.
- Develop scientifically verifiable success measures – progressive/completion criteria and targets – based on quantitative analysis at hub level.

