

# **AUSTRALIA'S ONLY RARE EARTH PROJECT WITH IN SITU RECOVERY POTENTIAL**

By

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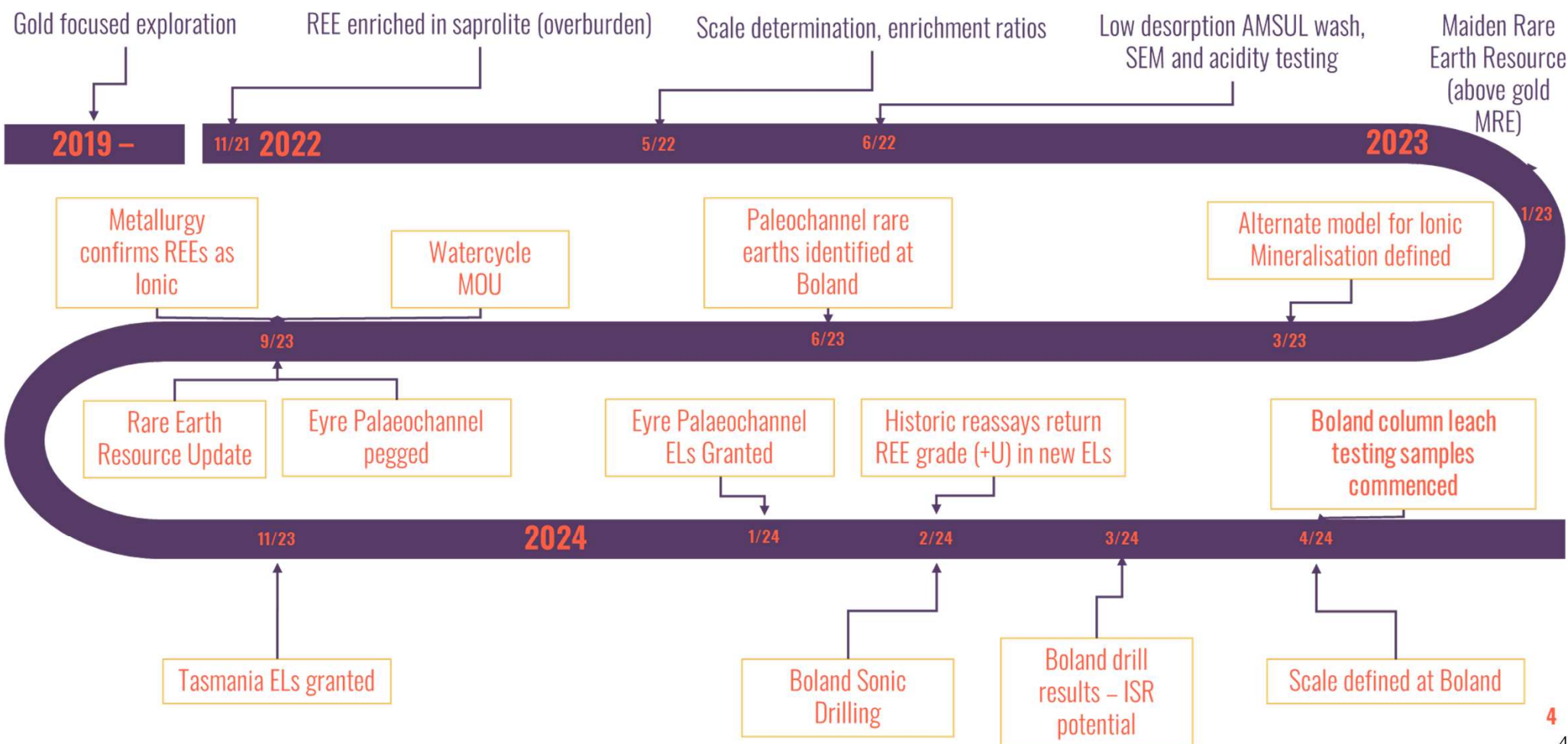
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# INDUSTRY DEFINING OPPORTUNITY

Discovered ionic REEs in 2023 within permeable, ISR enabling geology – making Boland globally unique

- ▶ Discovery of scalable – rare earth deposit amenable to lowest cost mining process
- ▶ Palaeochannel hosted – Ionic mineralisation
- ▶ ISR amenable
- ▶ Scalable MREC precipitation and gangue element removal
- ▶ Low cost CAPEX – Low cost OPEX – Low cost rehabilitation
- ▶ Experienced South Australian team
- ▶ Financially disciplined and capitalised to execute

# PROJECT HISTORY- RARE EARTHS



# IN SITU RECOVERY WHY GRADE IS NOT KING

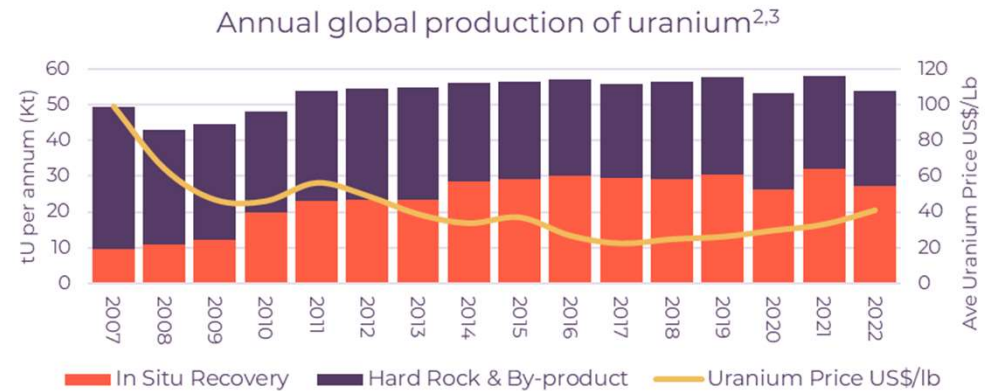
- Geology & metallurgy are fundamental to recovery cost. ISR and ionic mineralisation provide the opportunity to develop a low-cost and resilient source of rare earths
- ISR CAPEX costs are typically 10-15% of conventional mines<sup>1</sup>
- ISR operational costs 30-40% lower than conventional mines<sup>1</sup>
- ESG friendly method – temporary ground disturbance, less water consumption, no legacy landforms
- Scalable and resilient to commodity pricing cycles : demonstrated by global uranium supply – ~60% of uranium mined by ISR in 2023

Sources:

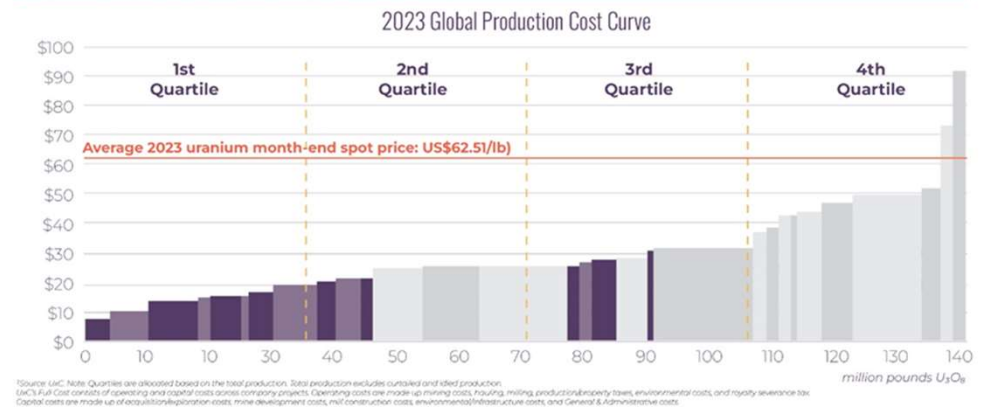
1 Statistics: United States Nuclear Regulatory Commissions [www.nrc.gov](http://www.nrc.gov) TradeTech – the nuclear review (October 2016)

2 STI/PUB/1697 (iaea.org)

3 Global price of Uranium (PURANUSDM) | FRED | St. Louis Fed (stlouisfed.org)



## LOW CASH COSTS DRIVEN BY COST-EFFICIENT ISR MINING METHOD



# IN SITU RECOVERY LOWERING THE ENVIRONMENTAL COST

“ Rio Tinto told investors the rehabilitation of the Ranger Uranium Mine would “materially exceed” \$2.2 billion - shareholders could face further equity raising. ”

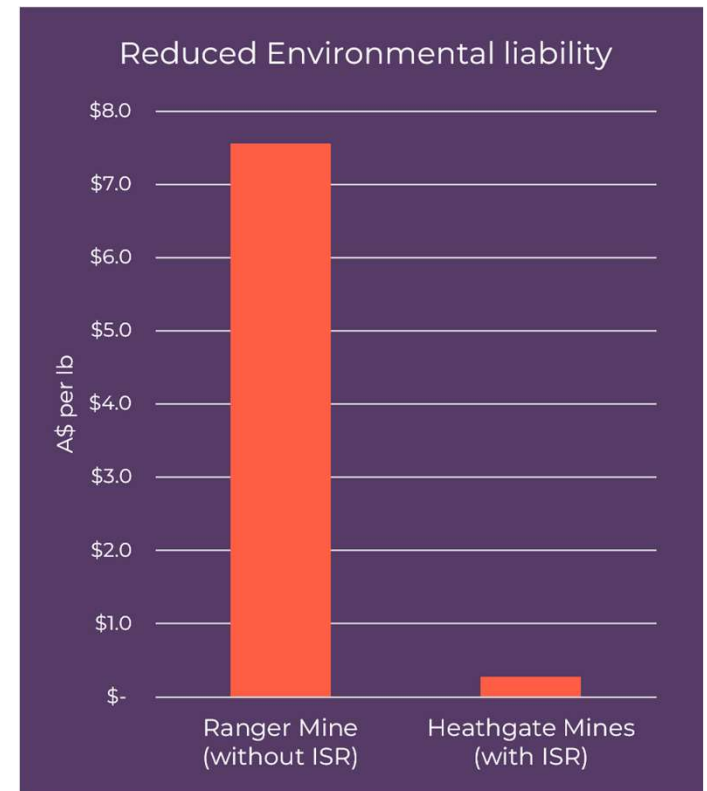
- ISR materially reduces environmental risk and cost
- Rio Tinto has recently confirmed cost blowouts for the Ranger Hard Rock mine to have blown out beyond \$2.2 Billion
- Ranger rehabilitation cost equates to ~\$7.6 per pound mined.
- This is ~28 times higher than the cost of rehabilitation of ISR mines in South Australia

Sources:

1 Energy Resources Australia announcement dated 26 September 2023

2 <https://world-nuclear.org/information-library/appendices/australia-s-uranium-mines>

3 <https://web.archive.org/web/20141109104121/http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/Appendices/Australia-s-Uranium-Mines/>



# DERISKING IONIC CLAY PROCESSING

High clay content ores result in metallurgical, productivity and environmental challenges

Ionic clay projects outside of China propose metallurgical flowsheets that include:

## PROCESS STEP

- Wet particle size separation
- Wet screen size beneficiation
- Heap leach or tank leaching
- De-sliming and processed ore removal

## CHALLENGE

- Water use, bottleneck, cost
- Ore loss, water use, bottleneck
- Bottleneck, environmental risk, cost
- Environmental and geotechnical risk, bottleneck, cost

In-situ recovery removes challenges and infrastructure;  
decreasing cost and environmental risk

# REALISING DISCOVERY VALUE

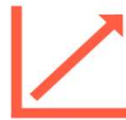
ISR is the key to overcoming capital challenges, increasing future operational profitability and generating an unrivalled environmentally credentialled source of critical rare earths.

In 2024 Cobra has been unlocking investment value by testing three deliverables:



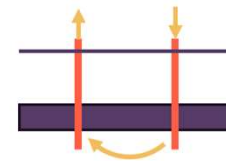
## HIGH GRADE

Refined sampling strategy to reflect chemistry boundaries should result in considerable increases of recoverable TREO grades



## SCALE

Low-cost approach - over 2,000km<sup>2</sup> of palaeo-channel



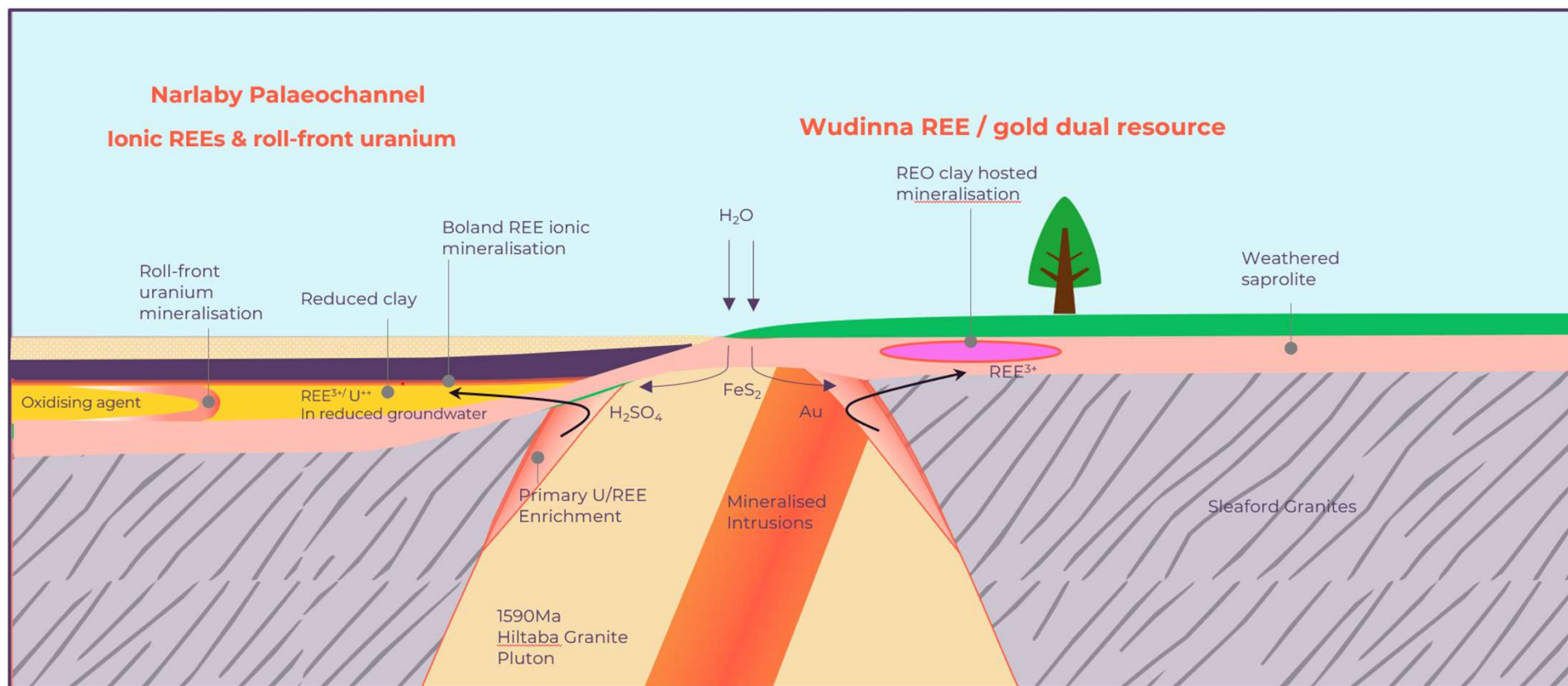
## ISR

Drill plan – fast and cost-effective approach to unlocking long-term value



# A GEOLOGICAL PROCESS THAT SHORTCUTS MINING & EXTRACTION

Mother Nature has completed the expensive process of hard rock rare earth extraction and mobilised valuable REEs to an accessible storage bank, allowing for a simple and cost-effective withdrawal



# GROWING A STRATEGIC, SCALABLE LOW-COST IONIC REE PROJECT

Cobra has made a unique ionic REE discovery and has moved to establish a dominant landholding to enable significant scale

## Favourable location

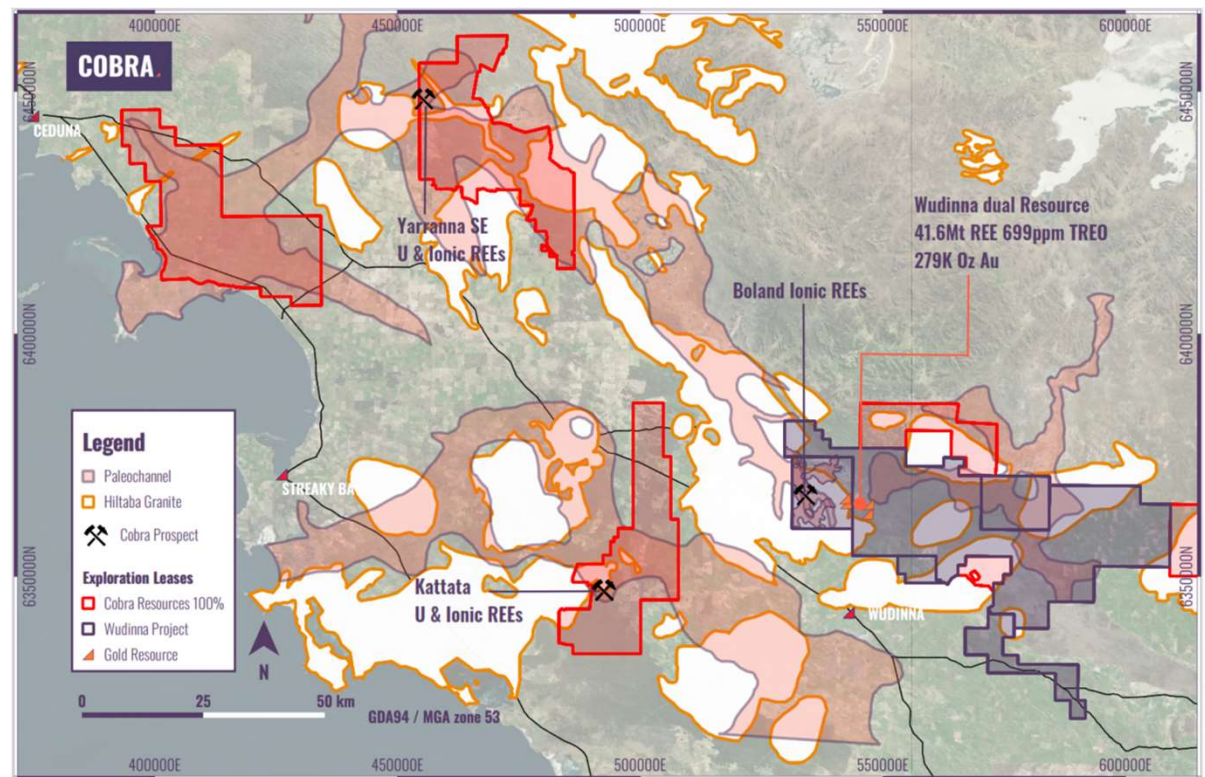
- Multiple ports within 200km
- Nearby infrastructure, including South Australian hydrogen energy hub
- Local sources of sulphuric acid

## Geological enrichment and mobility across tenements

- Enriched Hiltaba plutons occur across our land tenure
- Acidic groundwaters demonstrated across palaeosystems (pH as low as 2.2)
- Ionic mineralisation within transgressional marine sequences that are regionally extensive

## Geology favourable for REEs

- Enriched source rocks, mobility and ionic adsorption conditions



# CONDITIONS FOR IONIC REEs

## Enriched source

- ▲ Xenotime, monazite & zircon – primary mineralisation
- ▲ Hiltaba granites contain abundant sulphides – weathering yields acidity

## Importance of acidity

- ▲ Saprolite acidities as low as pH2
- ▲ Enrichment/ depletion observed with acidity
- ▲ Groundwater pH conditions at Boland are 6.5-7.5
- ▲ Groundwater in oxidised parts of channel very low – less than pH2
- ▲ Historic assays of 12,000ppb U - 120km down channel

## Production points of difference

- ▲ Integration into existing land use - dryland cropping
- ▲ Minimal ground disturbance – no handling of clays
- ▲ Rapid wellfield turnover – desorption characteristics

# ISR – DEMONSTRATING BOLAND'S ADVANTAGE

Preliminary results are very favourable for low cost in situ recovery

## High permeabilities in Zone 3

- High portion of sand 67% of mineralised interval greater than 0.1mm
- Zone 3 calculated transmissivity of 135 – 275 m/day

## Further work planned

- Samples drying for Zones 1 & 2
- Assaying of screened fractions
- Petrology and mineralogy studies
- Pump testing to validate calculations





# ADVANCING INSITU RECOVERY & PROVING GRADE

Rare earth mineralisation concentrated within three zones where geology is favourable for in situ recovery

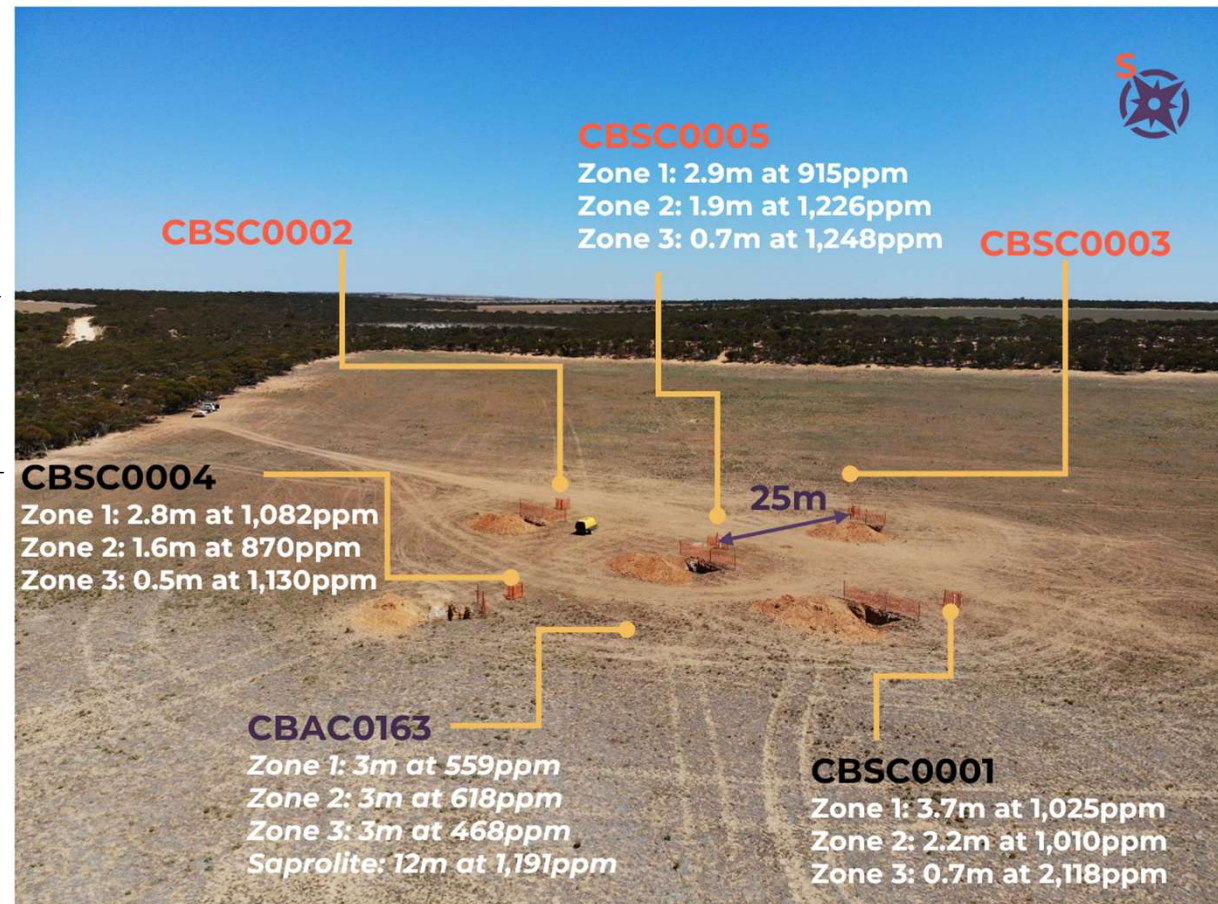
## Wellfield installed over defined mineralisation

Intersection weighted averages:

- **180% increase: Zone 1** - 3.1m at 1,007 ppm TREO where  $\text{Nd}_2\text{O}_3$  +  $\text{Pr}_6\text{O}_{11}$  totals 212 ppm and  $\text{Dy}_2\text{O}_3$  +  $\text{Tb}_2\text{O}_3$  totals 23.5 ppm from 15.6m
- **169% increase: Zone 2** - 1.9m at 1,043 ppm TREO, where  $\text{Nd}_2\text{O}_3$  +  $\text{Pr}_6\text{O}_{11}$  totals 205 ppm and  $\text{Dy}_2\text{O}_3$  +  $\text{Tb}_2\text{O}_3$  totals 22 ppm from ~20.5m
- **329% increase: Zone 3** - 0.6m at 1,538 ppm TREO where  $\text{Nd}_2\text{O}_3$  +  $\text{Pr}_6\text{O}_{11}$  totals 305 ppm and  $\text{Dy}_2\text{O}_3$  +  $\text{Tb}_2\text{O}_3$  totals 52 ppm from ~26.6m

## Geology favourable for in situ recovery

- Narrow, concentrated zones ideal for ISR
- Confined aquifer, saline and unused
- Permeable sands within mineralised zones



# RE-ASSAY VALIDATING INTERPRETATION OF SCALE

Low-cost exploration demonstrating scale and de-risking future drilling

## 11.5 km of mineralisation

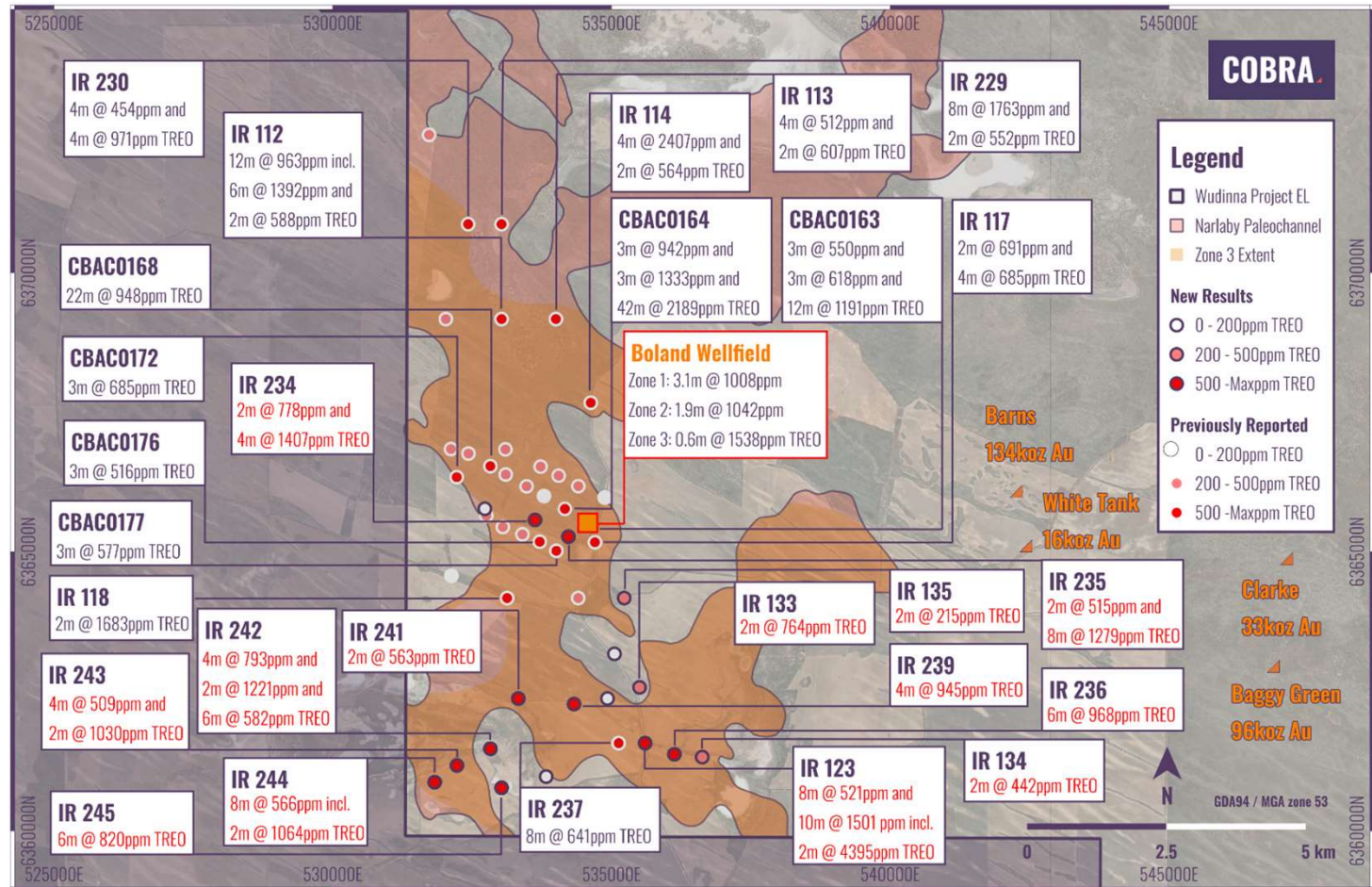
- Re-assay confirms mineralisation in Palaeochannel sediments along 11.5 km

## Geological enrichment and mobility across tenements

- Enriched Hiltaba plutons occur across our land tenure
- Acidic groundwaters demonstrated across palaeosystems (pH as low as 2.2)
- Ionic mineralisation within transgressional marine sequences that are regionally extensive

## Geology favourable for REEs

- Enriched source rocks, mobility and ionic adsorption conditions



# BOLAND IONIC REEs – ENABLING LOW-COST EXTRACTION

Boland heavy rare earth recoveries compare favourably to peers

## ANSTO – Metallurgical results confirm exceptional recoveries

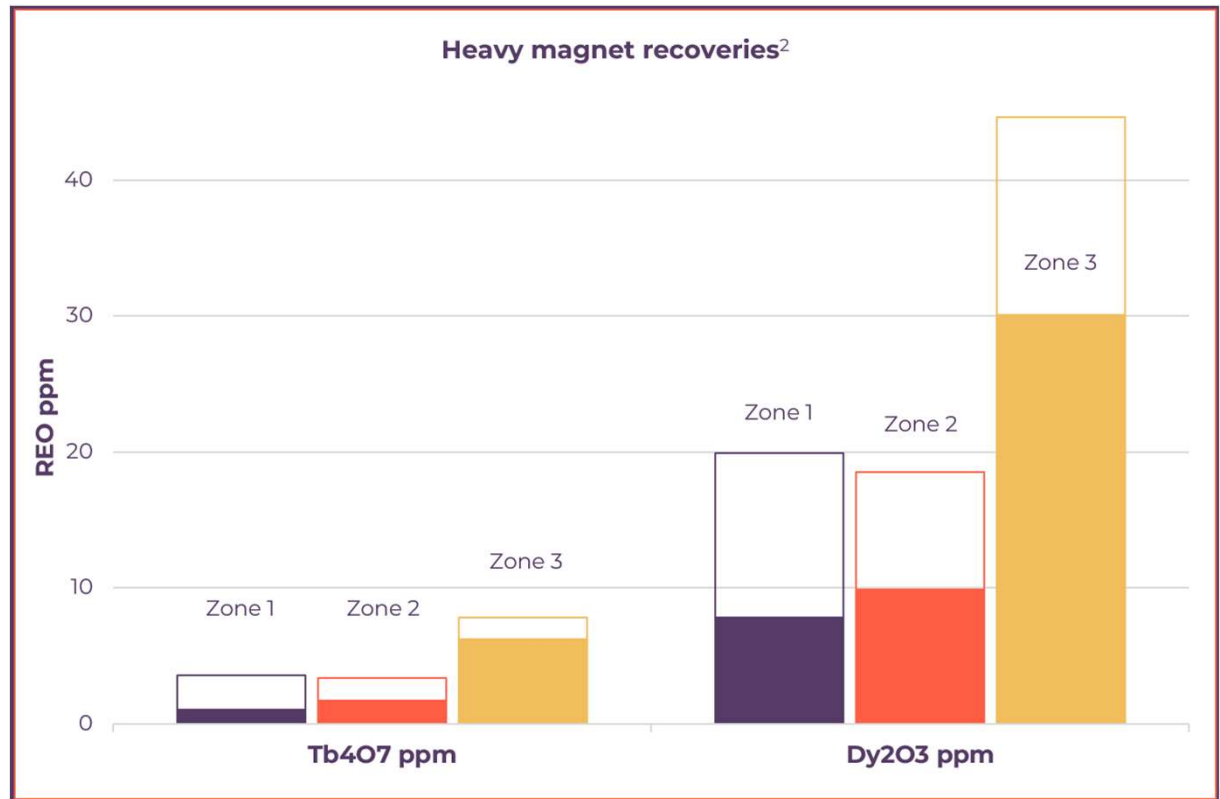
- Rapid recoveries in 30 minutes at pH 3-4
- Further increases in recovery achieved over 6 hrs

## Exceptional heavy REE recoveries

- Terbium price USD\$746 per Kg<sup>1</sup>
- Dysprosium price USD\$255 per Kg<sup>1</sup>
- Boland zone 3 HRE recoveries are highly desirable

## Superior ratios

- Magnet REE recoveries up to 58%
- Heavy REE recoveries up to 65%
- Low dissolution of gangue elements – Al, Ca, Fe, U, Th



<sup>1</sup> RE Oxide Pricing: [DPrice of Rare Earth Oxides live](#) | SMM - Metal Market

<sup>2</sup> Cobra – Average recoveries by mineralised zone

# ISR COLUMN LEACH TESTING

Low Cost Low Impact Extraction

- ▲ Column leach trials underway
- ▲ AMSUL extraction
- ▲ Sulfuric acid used to maintain pH 3
- ▲ Run at aquifer pressure and temperature
- ▲ Piloting end to end extraction flow sheet
- ▲ Post test XRD on fresh and spent ore
- ▲ Pregnant solution to be used for MREC trials



# MEMBRANE DESORPTION AND FILTRATION

Watercycle Technologies – Low capex, selective and scalable processing

- ▲ Graphene Engineering and Innovation Centre –  
Manchester, UK
- ▲ Direct Lithium Extraction and Crystallisation  
(DLEC™) technology to process brines
- ▲ Pilot scale production of lithium carbonate  
products from brines
- ▲ Piloting end to end extraction systems
- ▲ Chemistry membranes and resins to be tested for  
purification, precipitation and potential  
separation of REEs

# PROJECT ROADMAP

Near term news flow to define the value of the opportunity



# OUR STRATEGY TO DEMONSTRATE DIFFERENCE



## FOCUS

Advance ionic REE ISR  
extraction as our core  
business



## OPTIMISE

Prove In situ recovery,  
de-risk commercialisation  
pathway



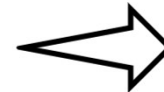
## EXECUTE

Define a resource of  
significance, develop  
metallurgical process



## CREATE VALUE

Optimise cost of mining &  
production, produce  
marketable MREC



## IMPLEMENT

Pathway for Cobra to become  
a low-cost MREC producer