Sprott | Equity Research

AUSTRALIAN RARE EARTHS (AR3 AU)

Initiating Coverage: Australia's only ionic clay HREE developer

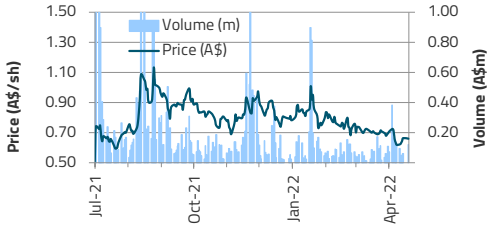
RECOMMENDATION: **BUY** *PRICE TARGET:* **A$1.30/sh** *RISK RATING:* **HIGH**

SHARE DATA	**A$0.69/sh**
Shares (basic, FD)	111 / 124
52-week high/low	1.13 / 0.51
Market cap (A$m)	76.6
Net cash (debt) (A$m)	9
1.0xNAV7% @ spot (A$m)	247
1.0xNAV7% FD (A$/sh)	A$2.00
P/NAV (x)	0.26x
Average daily value (A$m, 3M)	0.10

FINANCIALS	**FY25E**	**FY26E**	**FY27E**
TREO produced in MREC (t)	420	1,500	1,350
Revenue (A$m)	**20**	**94**	**84**
Koppamurra EBITDA	7.3	39.8	32.6
EBITDA (A$m)	**(0.9)**	**44.8**	**35.8**
EBITDA margin (%)	*-4%*	*48%*	*42%*
EV/EBITDA (x)	(206.4)	3.6x	4.0x
Income (A$m)	(9.4)	19.9	13.8
EPS (A$/sh)	(0.05)	0.11	0.08
PER (x)	(12.8)	6.0x	8.7x
CFPS (A$/sh)	(0.17)	0.14	0.13
P/CF (x)	(20.3)	4.2x	5.3x

NAV over time	**FY22E**	**FY23E**	**FY24E**
1xNAV7% FD (A$/sh)	2.27	2.04	2.10
ROI to 1xNAV (% pa)	229%	72%	45%

SOTP 1xNAV7% US$150/kg NdPr	**A$m**	**A$/sh**
Koppamurra	159	1.28
Resources outside mine plan	69	0.56
Other projects	25	0.20
Central SG&A & fin costs 4Q21	(17)	(0.14)
Net cash + options	12	0.10
TOTAL	**247**	**2.00**



Source: Factset

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**Note FY refers to year ended 30 June, otherwise years refers calendar year ended 31 December*

Australian ionic clay heavy rare earth developer

Australian Rare Earths is developing the Koppamurra ionic clay HREE project in South Australia. AR3 was founded by Directors Rick Pobjoy (Exec Director, mineral sands and clay geologist) and Bryn Jones (NED, uranium industry metallurgist). After identifying clay-hosted REE mineralization over 40km between successful drill holes, they brought on leading REE expert Dudley Kingsnorth as Chairman to advance a HREE-focused ionic clay strategy. Pre-IPO exploration work defined the 40Mt MRE and AR3 listed on the ASX in July 2021, while Don Hyma (mine builder, ex RIO) and Pauline Carr (ex-NEM, current Uni of South Aus chancellor) joined as MD and NED, respectively.

Keys: No radionuclides, low capex and can enter production quickly

In short, Koppamurra has the right rare earths (Nd, Pr, Dy, Tb) and no radionuclides; this means a valuable product, simple met and low capex. Heavy rare earths Dy and Tb are critical to high end permanent magnet uses in EVs, wind turbines and defense and Koppamurra is unusually enriched in Dy and Tb at ~35% of value compared to 5-10% for most deposits. Strategic end markets, rapid demand growth (~10% pa), and concentrated (90%) global supply from China/Myanmar result in key tangible advantages: low capex, rising prices, strategic funding sources and ability to expand modularly.

District potential: 40Mt starter resource growing rapidly

The 40Mt at 725ppm TREO resource was delineated on just 5% of the 4,000km^2 tenement package, with first drilling in December 2020 leading to maiden 39.9Mt MRE in April 2021. Subsequent drilling has seen both significant near MRE growth, and a completely new resource area emerge 40km to the north, covering 1.5x the surface area and with 63% of drilling >500ppm averaging 800ppm. We think the upcoming MRE in mid-2022 will highlight potential for a district scale asset that can grow quickly with inexpensive near surface drilling.

Best of all, avoids the red flags that kill most projects

The West desperately needs ex-China supply but many projects have red flags that are fatal or deeply delaying. These include low payability, high radionuclides, poor mineralogy, difficult metallurgy, adverse geography and/or unrealistic scope, product selection or development timelines. AR3 passes these key hurdles: simple metallurgy, good REE assemblage, good jurisdiction, low capex, fast exploration turnaround and no permitting red flags.

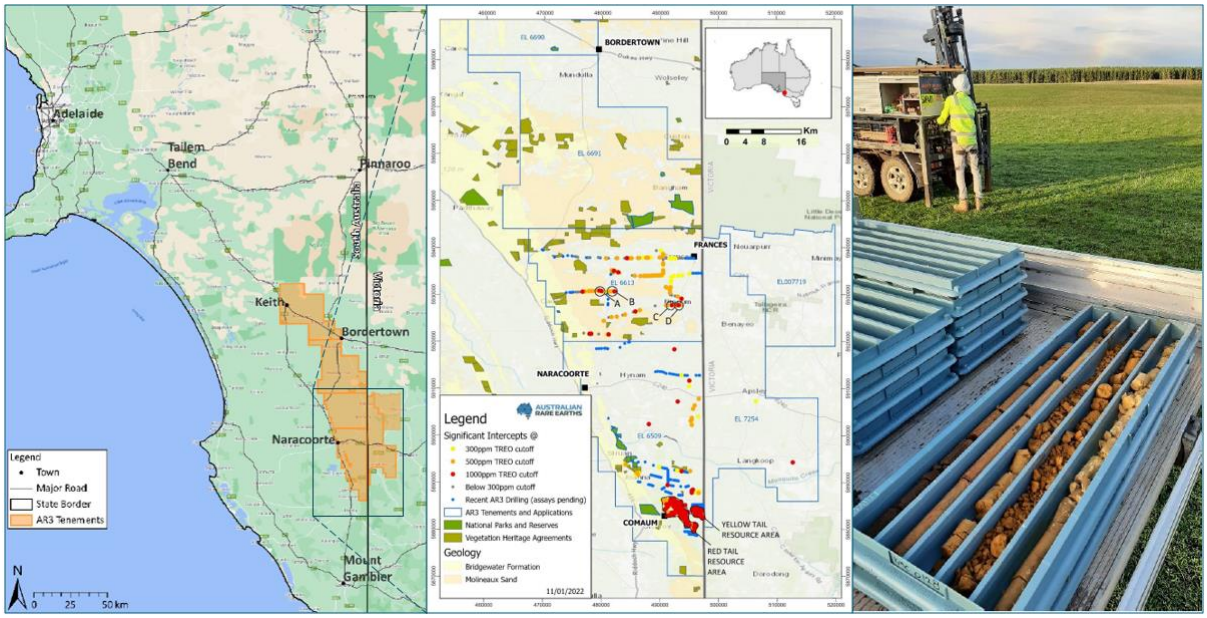
Initiate with Buy rating and A$1.30/sh PT based on 0.75xNAV$_{7\%}$

We model an initial 2.5Mtpa operation doubling in year four, producing 2,000tpa of contained REEs in a mixed rare earth carbonate including 450tpa of NdPr and, 50tpa of Dy and 10tpa of Tb. Running spot HREE prices and US$150/kg NdPr, we generate a FD NAV$_{7\%}$ of A$158m or A$1.28/sh. Adding in exploration, G&A and our funding assumptions, we generate a fully funded NAV$_{7\%}$ of A$302m or A$1.74/sh, for an A$1.30/sh FD/FF price target at 0.75x NAV.

Investment case

Australian Rare Earths (ASX:AR3), is an ASX-listed rare earths developer focused on discovery and development of ionic clay or clay-hosted heavy rare earth (HREE) deposits in Australia. AR3's flagship Koppamurra project comprises 4,000km^2 of adjoining tenements in South Australia and Victoria, Australia. The project has an April 2021 maiden inferred resource of 39.9Mt at 725ppm, enriched in heavy rare earths dysprosium and terbium, high NdPr content and low radionuclides. Metallurgical testing to date has achieved 44-68% recovery, in line with producing clay-hosted deposits. Management is led by CEO Don Hyma (MSc mineral processing), an experienced processing engineer with a lengthy career at Rio Tinto and Falconbridge; Chairman Dudley Kingsnorth, a respected professor and chemical engineer, former project manager at Mt Weld, and a long time leading rare earths expert; and Executive Director Rick Pobjoy, a world-class geologist in the mineral sands and clay deposit specialties.

Figure 1: Overview of Australian Rare Earths (AR3)

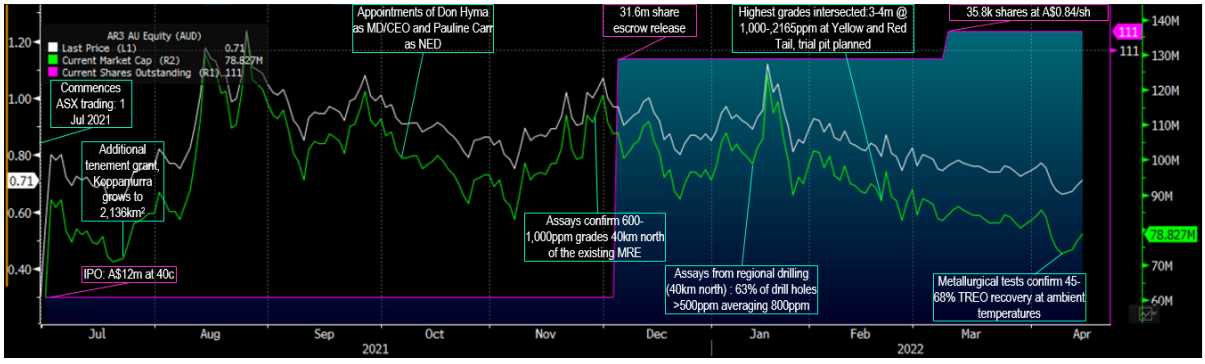


Source: Australian Rare Earths

History

AR3 was founded in Directors Bryn Jones (metallurgist and mining executive) and Rick Pobjoy (mineral sands and clay geologist). They identified Koppamurra following a 2016 PhD study that identified REE enrichment in the Murray Sedimentary Basin, known for uranium and mineral sands deposits. After initial drilling confirmed clay-hosted mineralization over a 40km strike, AR3 was formed with renowned rare earths expert Dudley Kingsnorth joining as Chairman. Shallow drilling starting from December 2021 quickly delineated a maiden 39.9Mt at 725ppm MRE in April 2021. AR3 capitalized on momentum with an A$12m IPO at 30c with first ASX trading in July 2021. AR3 has since demonstrated district potential, hitting minable grades up to 40km north of the current MRE, while also confirming 44-68% recoveries in lab testing, to support an upcoming MRE and PEA.

Figure 2: Price chart and history

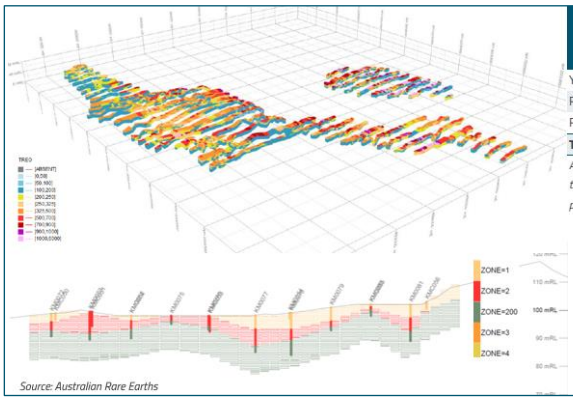


Source: Australian Rare Earths, SCPe, Bloomberg market data

Geology: REE-enriched clay hosted mineralization over extensive area

Resource: The current MRE covers two areas, Red Tail (10km along strike and up to 3km wide) and Yellow Tail (3km along strike and up to 2km wide). The mineralized clay horizon is 2-5 metres thick, averaging 3.5 metres, and near surface, with generally 1-3 metres of sandy overburden, and is thus amenable to low strip free dig mining. While the overall resource is 725ppm, there are extensive continuous zones of >1,000ppm and given the free dig and near surface nature of the mineralization, the mining sequence can be optimized for higher grades in early years. The deposit has good assemblage with 20.6% Nd + Pr content and high heavy enrichment at 2.6% Dy and 0.4% Tb. Uranium and thorium levels are below detection levels.

Table 1: (A) Koppamurra inferred JORC MRE; (B) Cross section (5884130 mN)

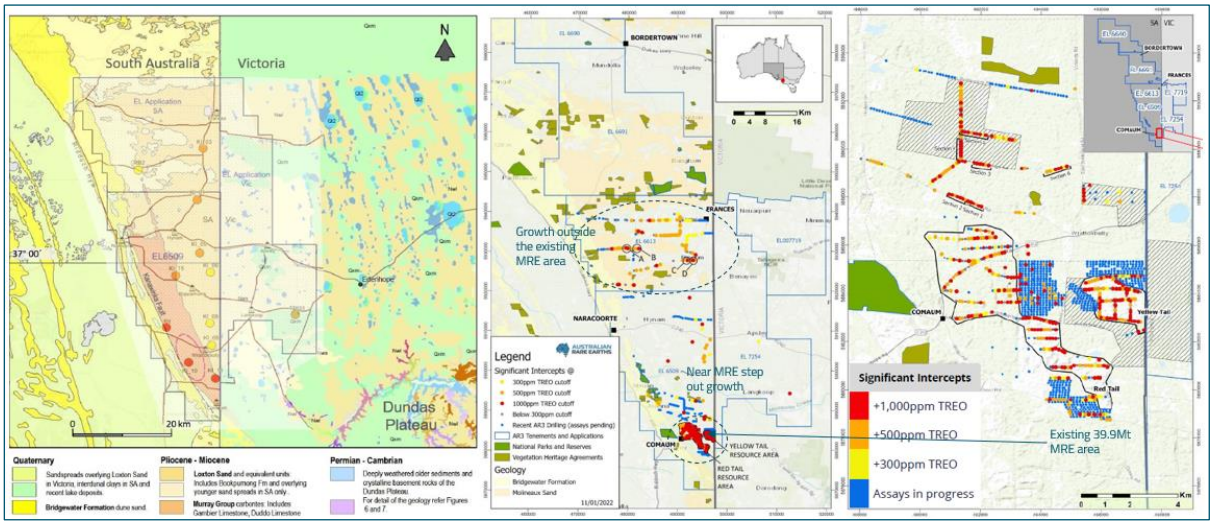


	Host Unit	Tonnes (Mt)	TREO (ppm)	TREO-CeO2 (ppm)	Nd[1] (ppm)	Pr[1] (ppm)	Dy[1] (ppm)	Tb[1] (ppm)	Insitu Magnet REEs ($/t)[2]	ThO2 (ppm)	U3O8 (ppm)
Yellow Tail	2	10.0	903	586	157	40	24	4	51	19.0	1.6
Red Tail	2	29.5	668	452	114	30	18	3	37	18.4	1.6
Red Tail	3	0.4	520	359	89	24	13	2	29	14.0	1.7
Total		**39.9**	**725**	**485**	**125**	**32**	**19**	**4**	**41**	**18.5**	**1.6**

*As at April 2021, JORC (2012); 325ppm TREO-CeO2 cut-off grade; host units: 2 = high grade clay; 3 = low-med grade clay in overburden troughs; top cut applied for REEs with high CoV; grades estimated using ordinary kriging; CoV Nd 1.55, Pr 1.56, Dy 1.29, Tb 1.23; block model: parent cell dimensions 50x250x1m XYZ with 2x4m sub-cell splits; * interpolated using 300 and 400ppm cutoff values*

Geology and upside: The source of the rare earths is interpreted to be fine-grained sediments of basalt-associated alkali volcanic origin, likely eroded basement rocks of the Dundas Plateau to the SW, transported by either river or wind and deposited onto a limestone base in an interdunal, lagoonal or shallow sea environment. The regional geological host the Murray Basin, a 300,000km^2 intercratonic sedimentary basin that is host to other mineral deposits. While not the tropical-weathered granitic deposit model of other clay-hosted REE deposits, the basin setting, extensive and consistent mineralized footprint, and nearby source of extensively weathered basement rocks gives us confidence that Koppamurra has district scale potential. Post-MRE drilling confirms this with above >1,000ppm intercepting an area covering another >30km^2 in near-MRE drilling and significant exploration success in the Francis (EL6613) area, with 63% of Francis drill holes hitting mineralization above a 500ppm cut-off, averaging 800ppm. Expansion drilling in the existing Comaun area also demonstrate significant footprint growth along trend to the north. Combined with the rapid delineation of the initial 39.9Mt in one field season and ~24,000m of drilling (4,000m to define the resource and 20,000m for infill and to define regional extent), we see potential for a long life, district scale (>100Mt asset) based on just Comaun and Francis, with even more potential on 90% of the licences not yet explored.

Figure 3: Koppamurra project area geology and plan map of drilling

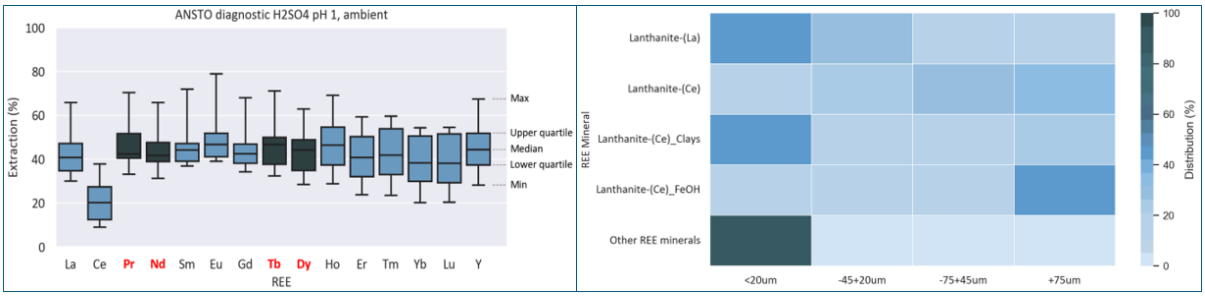


Source: Australian Rare Earths, SCPe

Metallurgy: Good recoveries at ambient temperature and using standard reagents

Koppamurra passes the key tests from a processing perspective: good recovery using conventional processing methods, low radionuclides and ability to produce an intermediate mixed rare earth concentrate product. Test results achieved 44-68% rare earth recoveries from varying head grades of 270-1500ppm, in line with existing Chinese operations in China and Myanmar, crucially at ambient temperature (good for operating cost profile) and using sulphuric acid (preferable availability to, and lower cost than, hydrochloric or nitric acid). Mineralogy work indicates the payable REEs are concentrated in the clay minerals (<20µm); this indicates a high degree of particle liberation = better recovery and leach times. Moreover, these results were achieved with robust sampling procedure (composites from 36 drill holes) and test work was undertaken by the leading specialists in the sector including ANSTO (metallurgy), the University of Toronto (metallurgy), SGS Lakefield (mineralogy) and ALS Brisbane (mineral identification and liberation) and several world-leading rare earths consulting metallurgists.

Figure 4: (A) Koppamurra recovery test results using sulphuric acid at ambient temperature; (B) Koppamurra REE distribution by particle fraction



Source: Australian Rare Earths, recovery results from ANSTO, mineralogy results from SGS Lakefield

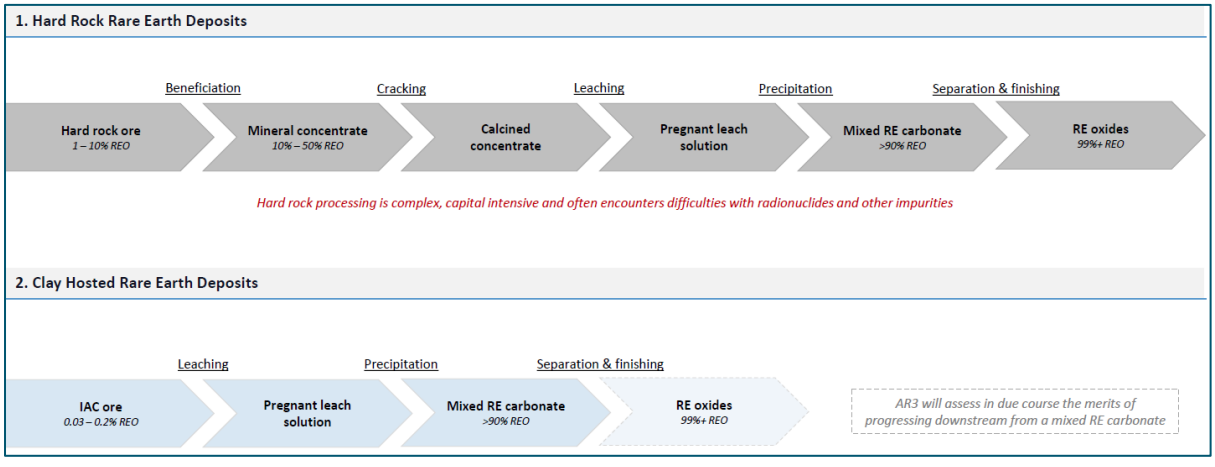
Areas of further optimisation: The primary opportunity identified is ore sorting to reduce the volume of acid-consuming carbonate minerals into the leaching circuit. Testing is underway at Bureau Veritas and will commence shortly at SGS Lakefield. In our view, size screening, hydrocycloning, and/or flotation could be viable options.

Next steps: Include commencement of proof of concept mining and progressive rehabilitation (2Q22), updated MRE (June 2022) incorporating 1,268 holes for 12,488m targeting maiden indicated as well as resource expansion to the north; metallurgical follow up test work in 2Q22-3Q22 and evaluation of downstream opportunities to leverage early mover advantage and need for HREE supply in Australia and the West.

Ionic clay deposits come with significant advantages: Opex, capex, and development time

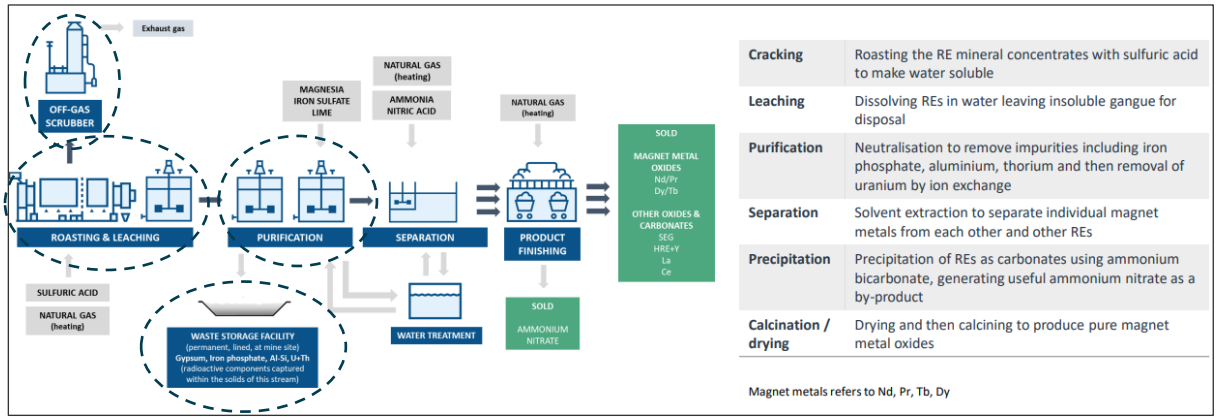
We believe Koppamurra can be developed quickly due to simple exploration, mining and metallurgy. Mineralization is at surface, thus amenable to low cost and fast turnaround shallow drilling, and easy to model. Opex and capex per tonne are low due to low strip / free dig and simple leach processing. Permitting should be fast as Koppamurra avoids the key difficulties: no native title issues, no radionuclide issues, no rare species, no lasting land impact, and no water issues. All this, in addition to key strategic importance, enables AR3 to target first production by 2025, aligning with OEM and government EV production and supply targets.

Figure 5: Comparison of hard rock vs ionic clay beneficiation stages



Source: Australian Rare Earths

Figure 6: Monazite (from mineral sands) processing flowsheet; circled stages are avoided in ionic clay processing



Source: Iluka Resources April 2022

Greener alternative: Lower emissions, and less long-term land disturbance

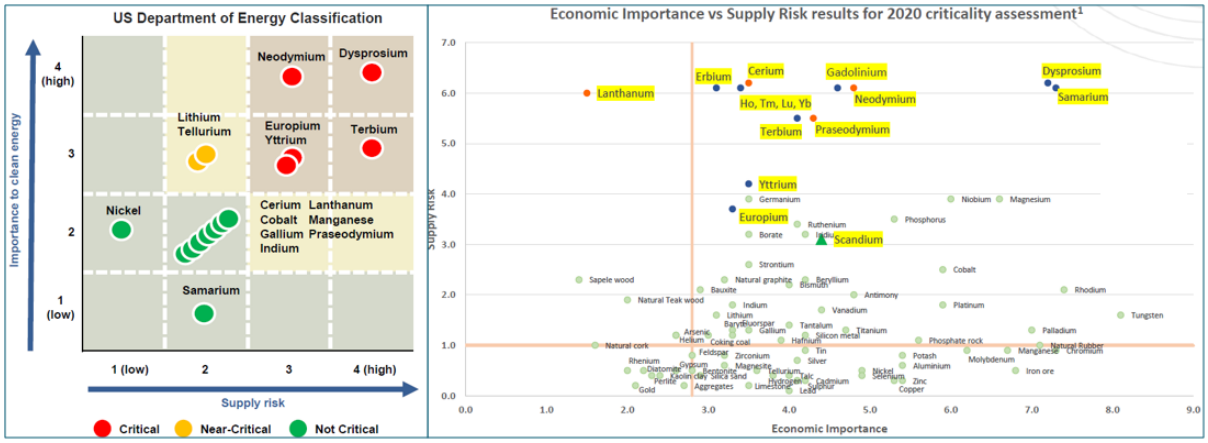
Noting the wider context of downstream users: EVs and wind energy in particular, it is important to highlight that ionic clays also have significantly lower environmental impact if built to western standards. Mining is free dig and mine areas are progressively rehabilitated rather than permanent open pits = **lower fuel consumption, fewer tonnes moved, less land disturbance**. Processing**:** Ionic-adsorbed rare earths can be put into solution quickly due to the light ionic bonds and small particle size, with fast leach times (1-2 hours in Koppamurra test work) and low reagent consumption vs hard rock minerals. No crushing, grinding or roasting required = **lower energy consumption**. Waste disposal: Once stripped of REEs, ore material is washed and progressively backfilled = **comprehensive land restoration**. In fact, washed clay rehabilitation improves crop productivity and is an existing farming practice. Monazite operations must dispose of uranium and thorium, in permanent waste storage due to radionuclide content. Transport**:** Ionic clay operations produce a mixed rare earth carbonate at site, minimizing transport requirements. By contrast, most hard rock mines, including Mountain Pass (MP Materials) and Mt Weld (Lynas) produce a concentrate which is then transported, often long distances, for cracking and leaching in locations with more advantageous logistics (energy, reagent and waste disposal costs/availability).

Figure 7: (A) Mountain Pass Mine; (B) Lynas Mt Weld Mine (W Australia) and Kuantan Refinery (Malaysia)

Heavy REE premium warranted: Crucial to EVs, renewables, defence, and geopolitical independence

Given their role in the production of high-performance magnets with unmatched physical properties, heavy rare earths, dysprosium (Dy) and terbium (Tb) are at or near the top of both US and EU government assessments of supply risk and economic importance. Key products that depend on these magnets include EV motors, wind turbines, high end electronics (e.g. speaker, earbuds, etc.), as well as a myriad of defense applications (e.g. aeronautics). Dy and Tb are required additions in conditions where temperature, motion or other demagnetizing forces are high; unsurprisingly, this includes the most geopolitically sensitive and thematically-relevant applications including military, aerospace and EVs. The addition of HREEs increases the useable temperature range for NdFeB magnets from 60°C to up to 240°C.

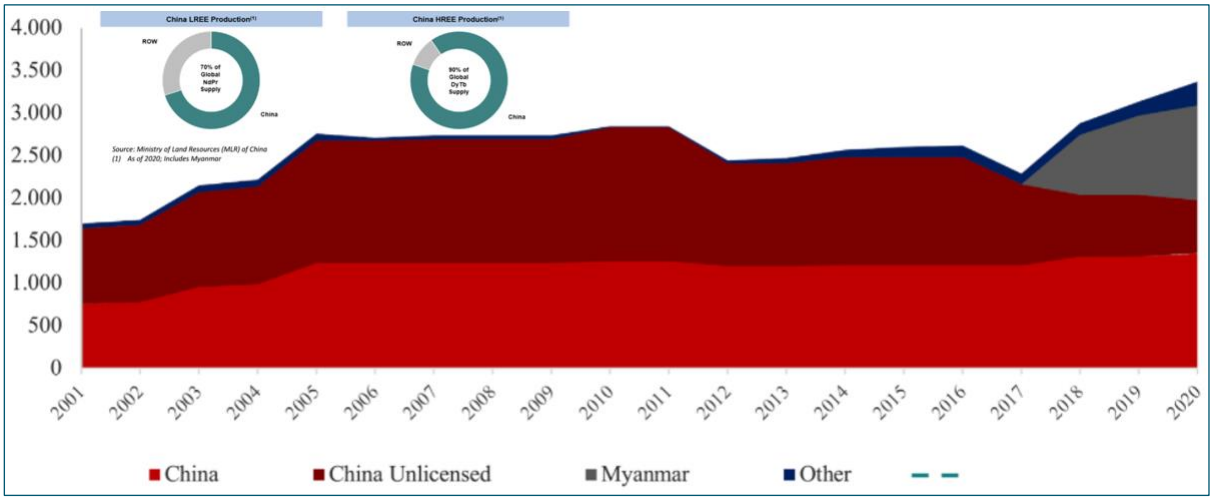
Figure 8: (A) US Dept of Energy and (B) EU commission assessment of critical metals



Source: US DOE (sourced from Aclara Resources), European Commission (sourced from Ionic Rare Earths)

The supply chain for HREEs is dominated by ionic clay production from China and Chinese-owned operations in Myanmar. Chinese and Chinese-owned production are estimated to represent 90% of global HREE production, even more concentrated than their collective 70% share of LREE production (including Nd and Pr).

Figure 9: Global supply of Dy and Tb, inset China market share of LREE and HREEs



Source: Aclara Resources – REO production based on USGS and Dy and Tb estimated based on papers and press releases. Unlicensed production estimate based on Argus Media

Australia premium also warranted: Govt funding for HREE projects transforms funding landscape

Australia's critical minerals strategy is comprehensive and explicitly targets rare earths as an area of focus. It has backed this with funding commitments through the following initiatives:

- **Export Finance Australia (EFA):** Supports Australian exporters, signed a letter of support to provide A$200m of LT debt to Arafura's Nolans LREE project in Northern Territory in May 2021
- **Critical Minerals Facility (A$2bn)** administered by Export Finance Australia: Established in 2022, contributed an A$1.05bn loan to Iluka's monazite refinery project in April 2022
- **Modern Manufacturing Initiative (A$1.3bn)** administered by EFA: Established to support mid-stage projects, rare earths activity includes A$30m direct funding for Arafura's Nolans project, A$15m for Lynas's downstream processing research. Non-REE deployments include A$120m for a Ni-Co refinery in WA and A$49m for Australian Vanadium. A$275m has been deployed thus far.
- **Northern Australia Infrastructure Fund (NAIF):** Responsible for supporting economic development in remote northern areas of Queensland, Northern Territory and Western Australia. Loans include A$140m to Hastings's Yangibana project in WA in December 2021.

Australia has also taken the lead in supporting and permitting cracking/leaching and separation including Lynas's Kalgoorlie refinery, Iluka's Eneabba monazite refinery, Arafura's Nolans LREE project and Hasting's Yangibana project. We believe the mature regulatory environment, presence of other successes on the ASX, and network effect of domestic knowledge means AR3 gets the best of both worlds: Tier I operating jurisdiction, ability to permit and develop quickly, and likely Government-backed pools of funding to lower the cost of capital.

Ticks the key boxes and avoids the fatal flaws

Unfortunately, most projects we review face challenges that are either fatal or could only be overcome with great difficulty and/or time. The most common of these are radionuclides (permitting risk, delays timeline, higher capex), logistics, metallurgy, payability and REE assemblage. Viable HREE projects are even harder to find as ionic clay deposits are rare and xenotime hard rock HREE deposits carry high radionuclides. AR3's Koppamurra passes the key tests: Low radionuclides, low capex, good recovery, good payability and good jurisdiction. Comparing to the relevant universe of REE development projects, we prefer the ionic clay projects, which benefit from low capex, good payability, are cheap on EV/production and can expand resources quickly, thus EV/insitu ratios are more attractive vs hard rock on a like-for-like. The market clearly values current production highly as evidenced by Lynas and MP's valuations and this leads to another reason why we prefer ionic clays (and Rainbow Rare Earths): they can be permitted and built to meet Govt and OEM 2025 sourcing targets. We are more sceptical on hard rock development projects noting greater permitting challenges than the clays, and lower grades than existing mines.

Table 2: Comp table of ionic clay, ASX-listed REE developers, and relevant producers

	Ionic clays / tailings (low opex, easy met)				Aussie hard rock - high radionuclides			Other hard rock			Producers	
Company	**AR3**	**Ionic**	**Aclara**	**Rainbow**	**Arafura**	**Hastings**	**Northern**	**Vital**	**American REs**	**Peak**	**Lynas**	**MP**
Project	**Koppamurra**	Makuutu	Penco	Phalaborwa	Nolans	Yangibana	Browns Range	Nechalacho	Le Paz	Ngualla	Mt Weld	Mountain Pass
Location	**S. Australia**	Uganda	Chile	South Africa	N. Australia	W. Australia	W. Australia	NWT, Canada	Arizona	Tanzania	W. Australia	California
Stage	**Resource**	Scoping study	Scoping study	Resource	Pilot Plant	Scoping study	Pilot Plant	Producer	Resource	Scoping Study	Producer	Producer
Resource Tonnes	**39.9**	315.0	22.8	38.0	56.0	27.4	9.2	94.7	128.2	214.4	55.2	42.4
Resource Grade (ppm)	**725**	650	2,415	4,300	26,000	9,700	6,700	14,640	370	21,500	53,000	60,137
Ore Type	**Ionic clay**	Ionic clay	Ionic clay	Gypsum	Monazite/Apatite	Monazite	Xenotime	Bast/Xeno	Allanite	Bastnaesite	Monazite	Bastnaesite
Nd (ppm)	**125**	121	317	1,009	5,491	2,640	Not discl	2,910	54	347	19,500	7,303
Pr (ppm)	**32**	29	74	246	1,373	660	Not discl	780	14	103	Incl in Nd	2,594
Dy (ppm)	**19**	20	62	43	Not discl	Not discl	570	Not discl	7	3	338	Not discl
Tb (ppm)	**4**	3	9	16	Not discl	Not discl	80	Not discl	1	2	Not discl	Not discl
Minesite product[1]	**MREC**	MREC	MREC	Oxides	Oxides	MREC	Concentrate	Concentrate	Not discl	MREC	Concentrate	Concentrate
Production (ktpa REO)	**2.0**[2]	2.7[2]	0.7	7.0[2]	4.9	3.4	3.9	0.5	Not discl	9.3	25	40
EV (US$m)	**49**	183	-6	100	455	327	183	180	123	115	5,826	8,131
EV/insitu	**3%**	1%	0%	1%	1%	2%	4%	0%	6%	1%	3%	13%
EV + capex/insitu	**8%**	2%	5%	2%	2%	6%	10%	--	--	3%	3%	13%
EV + capex / prodn	**62**	102	152	29	249	232	111	--	Not discl	52	233	203
Risks evaluation												
Radionuclides	**Low**	Low	Low	Low	High	High	High	Low to high	High	Low	High	Low
Capex (US$m)	**75**[2]	89[2]	119	100[2]	768	461	247	Not current	Not discl	365	--	--
Minesite recovery (%)	**44-68%**	54%	18%	70%[2]	61%	74%	80%	70%	Not discl	45%	70%[2]	70%
Minesite payability (%)	**60-70%**	60-70%	60-70%	90-100%	90-100%	30-40%	30-40%	30-40%	Not discl	30-40%	30-40%	30-40%
Infrastructure - SCPe	**Good**	Good	Good	Good	Remote	Moderate	Good	Remote	Good	Remote	Built	Built
Permit risk - SCPe	**Low**	Low	High	Low	High	Low	Low	High	High	Moderate	Low	Low
Notable permit risks - SCPe	**Low**	RAP	Nearby forest reserve	Low	Radionuclides	Radionuclides	Radionuclides	Radionuclides, wildlife	Radionuclides, BLM	Downstream	--	--

Source: Company disclosure, SCPe and market data from Factset; (1) Minesite only, excludes downstream; concentrate = 30-40% payability; MREC = mixed rare earth carbonate, ~60-70% payability; oxides = separated oxides, ~90-100% payability; (2) SCPe

Valuation

We value Australian Rare Earths using a discounted cash flow methodology. We model a 60Mt at 750ppm mine inventory at Koppamurra and add 100Mt at 700ppm TREO to the mine plan. We model an initial 2.5Mtpa operation with an expansion in 2028 (year 4) to 5Mtpa. This generates average annual production of 2,000tpa of rare earths including 450tpa of NdPr and, 50tpa of Dy and 10tpa of Tb and an $NPV_{7\%}$ of A$158m. In addition, we add A$69m for resource growth potential (SCPe 25Mt at 750ppm at 5% in-situ value) and A$25m for AR3's other exploration projects in WA and NSW. We add A$8.7m for cash on balance sheet, A$4m for ITM options while we subtract A$24m for SG&A. This results in a fully diluted but pre-funded NAV of A$247m or A$2.00/sh. We assume A$55m of equity including evaluation and build funding. With the funding but also dilution added, we generate a fully diluted NAV estimate of A$302m or A$1.74/sh.

Figure 10: SCPe Valuation build-up

Group-level SOTP valuation	A$m	O/ship	A$/sh
Koppamurra NPV 1Q22e	159	100%	1.28
SCPe 25Mt MRE growth - 5% insitu value	69	100%	0.56
Exploration ind other Aussie projects	25	100%	0.20
Central SG&A & fin costs 1Q22e	(17)	-	(0.14)
Cash and restr. cash 4Q21	9	-	0.07
Cash from options	4	-	0.03
Debt 4Q21	-	-	-
1xNAV7% spot fully diluted, pre-funded	**247**		**2.00**
Assumed equity raised	55		0.32
1xNAV7% spot fully funded	**302**		**1.74**
Target Multiple (P/NAV)			**0.75x**
Price Target (A$/sh)			**1.30**

Resource / Reserve	Mt	ppm TREO	000t REO	$m insitu	EV/insitu
Measured, ind. & inf.	40	725	29	1,877	2.68%
SCPe Mine Inventory	60	750	45	2,117	2.38%

Share data				
Basic shares (m): 111.0	FD + options (m):	123.6	FD/FF	173.6

Source: SCPe

Initiate with BUY rating and A$1.30/sh price target based on 0.75x $NAVPS_{7\%}$

We initiate with a BUY rating and A$1.30/sh price target based on 0.75x fully funded $NAV_{7\%}$ using LT prices of US$150/kg NdPr, US$500/kg Dy and US$2,200/t Tb. We think the combination of a domestic Australian HREE asset, ability to permit, build and develop quickly and for low capex makes AR3 ideally placed to become an important supplier of Dy and Tb for the Western supply chain. Upside comes from i) rapid progression to production, ii) exploration upside noting that just 5% of the target area has been explored and the asset has only been drilled since December 2020, and iii) potential agreement with strategic and government counterparties on Koppamurra offtake and potential downstream collaboration.

Our preference in rare earths is for assets that can get into production by 2025. This i) aligns with key Government and OEM EV production and supply chain targets and ii) provides first mover advantage for the project owners, as we believe a lack of raw feed will enable the first generation of companies to secure integrated status in the supply chain. The market is clearly rewarding Western companies with first mover status as evidenced by MP Material's US$9.2bn mcap for 42ktpa REO in concentrate production (30-40% payability) and Lynas's A$8.7bn market cap for 20ktpa of rare earths in a mixed REO carbonate (60-70% payability).

Catalysts

- June 2022: Updated Koppamurra MRE
- 2022: Trial mining, further metallurgical testing and process optimisation
- 2022-2023: SCPe PEA, FS and permitting
- 2024: SCPe permitting, finance and production decision
- 2H24-1H25: SCPe construction
- 2H25: SCPe steady state production

Why we like Australian Rare Earths

- Domestic Australian source of HREEs
- Can enter production by 2025 due to low capex, quick build and no permitting red flags
- Exploration upside on huge 4,000km^2 tenements that were first drilled in December 2020

Ticker:	AR3 AU	**Price / mkt cap:**	A$0.69/sh, A$77m	**Market P/NAV:**	0.26x	**Assets:**	Koppamurra
Analyst:	J Chan / E Magdzinski / B Gaspar	**Rec / PT:**	BUY / A$1.30	**1xNAV FD:**	A$2.00/sh	**Country:**	Australia

Group-level SOTP valuation	4Q21	**1Q22e**			
		A$m	**O/ship**	**NAVx**	**A$/sh**
Koppamurra NPV 1Q22e		159	100%	0.75x	1.28
SCPe 25Mt MRE growth - 5% insitu value		69	100%	0.75x	0.56
Exploration incl other Aussie projects		25	100%	0.75x	0.20
Central SG&A & fin costs 1Q22e		(17)	-	0.75x	(0.14)
Cash and restr. cash 4Q21		9	-	0.75x	0.07
Cash from options		4	-	0.75x	0.03
Debt 4Q21		-	-	0.75x	-
1xNAV7% spot fully diluted, pre-funded		**247**			**2.00**
Assumed equity raised		55		0.75x	0.32
1xNAV7% spot fully funded		**302**			**1.74**

1x fully funded NAVPS sensitivity to gold price and discount / NAV multiple

Valuation (A$/sh)	NdPr: $100/kg	$125/kg	$150/kg	$175/kg	$200/kg
0.50xNAV	0.40	0.65	0.85	1.10	1.35
0.60xNAV	0.50	0.75	1.05	1.30	1.60
0.75xNAV	0.60	0.95	**1.30**	1.65	2.00
1.00xNAV	0.80	1.30	1.75	2.20	2.65
Valuation (A$/sh)	Dy: $350/kg	$425/kg	$500/kg	$575/kg	$650/kg
0.50xNAV	0.70	0.80	0.85	0.95	1.05
0.60xNAV	0.85	0.95	1.05	1.15	1.25
0.75xNAV	1.05	1.20	**1.30**	1.45	1.55
1.00xNAV	1.40	1.60	1.75	1.90	2.05
Koppamurra NPV7% (US$m)	$100/kg	$125/kg	$150/kg	$175/kg	$200/kg
10% discount	28	68	107	146	185
8% discount	48	94	139	185	231
7% discount	59	109	**159**	208	258
6% discount	72	126	180	234	288
5% discount	87	146	205	263	322

Koppamurra 1xNAV sensitivity to recovery and payability

Koppamurra NPV7% (US$m)	Recov: 50.0%	55.0%	60.0%	65.0%	70.0%
Payability: 60%	64	75	86	97	108
Payability: 70%	137	148	**159**	169	180
Payability: 80%	210	221	231	*242*	253
Payability: 90%	282	293	304	315	326
Payability: 100%	355	366	377	388	398

Valuation over time	**Jun '22**	**Jun '23**	**Jun '24**	**Jun '25**	**Jun '26**
Koppamurra NPV (US$m)	96.9	106.1	146.9	185.2	175.9
Downstream	137.6	147.2	157.5	168.5	251.6
Exploration and in-situ tonnes	68.7	68.7	68.7	68.7	68.7
Cntrl G&A & fin costs (US$m)	(17.1)	(16.8)	(26.6)	(3.6)	4.7
Net cash at 1Q (A$m)	8.7	24.1	17.4	(64.2)	(42.1)
1xNAV (A$m)	295	329	364	355	459
P/NAV (x):	0.30x	0.34x	0.33x	0.34x	0.26x
Shares O/S(m)					
1xNAV share px FD (A$/sh)	2.27	2.04	2.10	2.04	2.64
ROI to equity holder (% pa)	*229%*	*72%*	*45%*	*31%*	*31%*

Sources and uses of cash

SCPe evaluation costs	A$10m	SCPe current cash + options	A$12m
SCPe capex (A$100m)	A$100m	Debt package	A$80m
SCPe contingency	A$18m	Equity Raised	A$55m
SCPe G&A + fin. cost to prodn	A$8m		
SCPe working capital	A$8m		
Total uses	A$144m	Total proceeds	A$147m

Production (100%)	**Jun '24**	**Jun '25**	**Jun '26**	**Jun '27**	**Jun '28**
Koppamurra (t REE)	--	420	1,500	1,350	1,099
Koppamurra (t Nd+Pr)	--	89	317	286	232
Koppamurra (t Dy)	--	11	39	35	29
Koppamurra (t Tb)	--	2	7	6	5
Koppamurra revenue (US$/kg REE)	--	63	63	63	63
Koppamurra cash cost (US$/kg REE)	--	38	27	30	37
Koppamurra AISC (US$/REE)	--	56	44	47	54

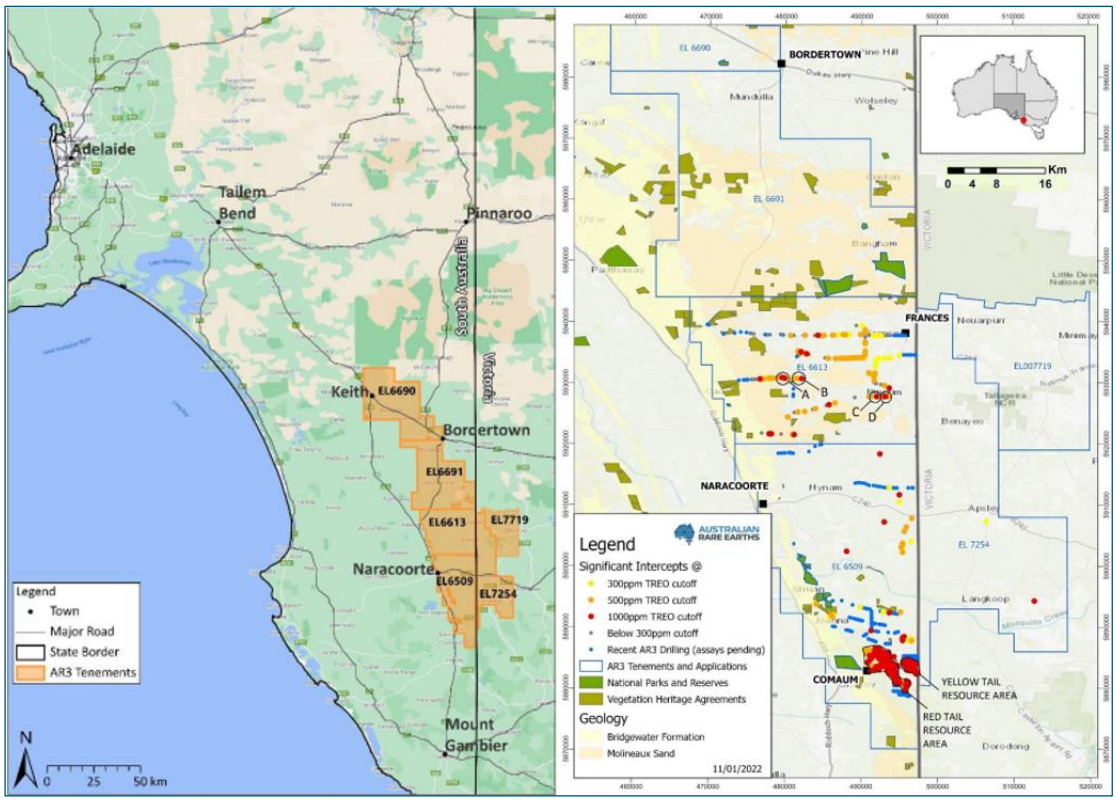
Source: SCP estimates

Resource / Reserve	**Mt**	**ppm TREO**	**000t REO**	**$m insitu**	**EV/insitu**
Measured, ind. & inf.	40	725	29	1,877	2.68%
SCPe Mine Inventory	60	750	45	2,117	2.38%
Commodity price	**Jun '22**	**Jun '23**	**Jun '24**	**Jun '25**	**Jun '26**
NdPr price (US$/t)	143	113	154	154	154
Share data					
Basic shares (m): 111.0		FD + options (m):	123.6	FD/FF	173.6
Ratio analysis	**Jun '22**	**Jun '23**	**Jun '24**	**Jun '25**	**Jun '26**
FD shares out (m)	149	174	174	174	174
EPS (US$/sh)	(0.02)	(0.01)	(0.03)	(0.05)	0.11
CFPS before w/c (US$/sh)	(0.02)	(0.01)	0.06	(0.17)	0.14
FCFPS pre growth (US$/sh)	(0.02)	(0.01)	0.16	(0.09)	0.13
FCF/sh (US$/sh)	(0.05)	(0.03)	(0.24)	(0.47)	0.13
FCF yield pre growth (US$/sh)	(3%)	(2%)	23%	(12%)	18%
FCF yield (%)	(7%)	(5%)	(35%)	(68%)	18%
EBITDA margin (%)	-	-	-	(4%)	48%
FCF margin (%)	--	--	--	(408%)	24%
ROA (%)	(9%)	(6%)	(4%)	(7%)	13%
ROE (%)	(9%)	(6%)	(8%)	(18%)	28%
ROCE (%)	(9%)	(6%)	(4%)	(3%)	26%
PER (x)	(30x)	(56x)	(24x)	(13x)	6x
P/CF (x)	(34x)	(60x)	(24x)	(20x)	4x
EV/EBITDA (x)	(24x)	(48x)	(26x)	(206x)	4x
Income statement	**Jun '22**	**Jun '23**	**Jun '24**	**Jun '25**	**Jun '26**
Revenue (US$m)	--	--	--	20	94
COGS (US$m)	--	--	--	(17)	(44)
Gross profit (US$m)	**--**	**--**	**--**	**3**	**50**
Expenses (US$m)	(3)	(4)	(0)	(1)	(3)
Impairment & other (US$m)	--	--	--	--	--
Net finance costs (US$m)	--	--	(1)	(5)	(4)
Tax (US$m)	--	--	--	--	(12)
Minority interest (US$m)	--	--	--	--	--
Net income attr. (US$m)	**(3)**	**(4)**	**(1)**	**(2)**	**31**
EBITDA (US$m)	*(3)*	*(2)*	*(4)*	*(1)*	*45*
Cash flow	**Jun '22**	**Jun '23**	**Jun '24**	**Jun '25**	**Jun '26**
Profit/(loss) after tax (US$m)	(3)	(2)	(5)	(9)	20
Add non-cash items (US$m)	--	--	--	3	9
Less wkg cap / other (US$m)	--	0	16	(24)	(4)
Cash flow ops (US$m)	**(3)**	**(2)**	**11**	**(30)**	**25**
PP&E (US$m)	--	--	(50)	(51)	(3)
Other (US$m)	--	--	--	--	--
Cash flow inv. (US$m)	**(4)**	**(4)**	**(52)**	**(51)**	**(3)**
Debt draw (repayment) (US$m)	--	--	40	40	--
Equity issuance (US$m)	25	--	35	--	--
Other (US$m)	--	--	--	--	--
Cash flow fin. (US$m)	**25**	**--**	**75**	**40**	**--**
Net change post forex (US$m)	18	(6)	33	(42)	22
FCF (US$m)	*(7)*	*(6)*	*(41)*	*(82)*	*22*
Balance sheet	**Jun '22**	**Jun '23**	**Jun '24**	**Jun '25**	**Jun '26**
Cash (US$m)	30	24	57	16	38
Accounts receivable (US$m)	0	0	0	7	12
Inventories (US$m)	0	0	--	9	5
PPE & exploration (US$m)	5	9	61	109	103
Other (US$m)	--	--	--	--	--
Total assets (US$m)	**35**	**33**	**118**	**141**	**158**
Debt (US$m)	--	--	40	80	80
Other liabilities (US$m)	1	1	17	8	5
Shareholders equity (US$m)	38	38	72	72	72
Retained earnings (US$m)	(4)	(6)	(11)	(20)	(0)
Minority int. & other (US$m)	--	--	--	--	--
Liabilities+equity (US$m)	**35**	**33**	**118**	**141**	**158**
Net cash (US$m)	*30*	*24*	*17*	*(64)*	*(42)*
Net debt to NTM EBITDA (x)	*15.0x*	*6.0x*	*19.5x*	*1.4x*	*1.2x*

Koppamurra, South Australia/Victoria (100% owned)

Koppamurra is comprised of four tenements in SE South Australia and two tenements in Western Victoria totalling >4,000km^2 of which less just ~5% has been drilled. The resource area is on farmland near the town of Naracoorte (pop 6k) with the town of Mt Gambier (pop ~30k) approximately 100km to the south. The state capital of Adelaide is located ~340km away (3.5 hrs) by highway. The property was previously explored by prior operators for coal, uranium and mineral sands from the 1970s to 2000s. A 2016 PhD study encountered elevated REEs in soil samples which led to AR3 staking the tenements in 2020 commencing drilling in December 2020. Drilling intersected laterally extensive 2-3-metre-thick clay horizons enriched in rare earths showing consistent grades and thicknesses leading to an initial 39.9Mt initial MRE.

Figure 11: Location map and surrounding infrastructure



Source: Australian Rare Earths

Mining and processing

Mining: The deposit is near surface with 3m of cover, thus should be low strip and low cost. We expect a free dig operation using excavators and articulated dump trucks (ADTs), with progressive backfill of mined areas limiting surface disturbance at any given time.

Processing: Testing to date indicates 44-68% rare earth recovery at ambient temperature using sulphuric acid. At this juncture we think an agitated leach operation is the most likely scenario, with potential for screening, hydrocycloning and/or flotation at the front end to reject volume and acid consuming materials pre-leach. Test work parameters of interest to us include reagent consumption, ability to ore sort, and acid recycling. Overall we expect low processing costs relative to a hard rock operation due to no comminution, ambient temperature and lower reagent consumption.

Infrastructure and other: Due to low radionuclides, processed material should be amenable to progressive backfill; we expect waste to be washed, filtered for moisture reduction, and backfilled into mined out areas. This should eliminate the need for waste and/or tailings storage. We expect process water to be recycled with additional water sourced from bore fields. Area access is good as the Riddock Highway runs NW-SE down the western side of the licence and project areas are road accessible. Given the proximity of Naracoorte and Mount Gambier, we expect a drive-in drive-out operation, which saves the costs associated with a camp/FIFO operation.

Economics

SCP modelled scenario: The below are SCPe assumptions, noting that AR3 is currently in the resource definition stage and has yet to complete an economic assessment. They are not to be taken as guidance from management.

Inventory: We model a total LOM inventory of 60Mt at 750ppm. We think the existing drilled footprint, including extensional drilling to the north of the April 2021 MRE already justifies this.

Ops: We model a free dig open pit mining operation at 1:1 strip down to an average of 10 metres below surface with progressive backfill with OP mining costs of A$2.00/t. We model a cyanide leach process with a 80% mass pull and 95% recovery ore sort through the front end, and 60% recovery through the leaching process with overall processing costs of A$1.0/t sorted and A$12.0/t leached (A$9.0/t leached post expansion). We model a 12-month construction period from mid-2024 (calendar year) to mid-2025 with first production in mid-2025 initially at a 2.5Mtpa run rate with an expansion to 5Mtpa in year four of the mine life (FY28) to 5Mtpa. We model higher grades (1,000ppm) in the first 2.5 years of the mine life reverting to LOM average 750ppm thereafter. This produces a 13-year mine life producing an average of 2,000tpa of rare earths in a mixed rare earth carbonate.

Capex: We model initial capex of A$100m for 2.5Mtpa with A$50m for the expansion to 5Mtpa in year-four, and A$5m per year of sustaining capital.

Margins and economics: We estimate average annual revenue of A$85-140m with annual opex of A$40-70m, 4% royalties (A$4-6m per year) generating healthy LOM EBITDA margins of A$47% and average annual US$39m per year for FCF. This generates an $NPV_{7\%}$ of A$158m and IRR of 23% with FCF payback in FY30 (due to the expansion). While we model the expansion funded from cash flow, we think there is significant re-rating potential once AR3 reaches steady state production looking to Lynas and MP as examples of current valuation of de-risked producers. If AR3 trades at similar multiples (20-30x revenue in the case of Lynas and MP), AR3 could trade at A$1.5-2.0bn on SCPe FY26/FY27 revenue and the A$50m of expansion capital would represent just 2-3% of pro-forma market cap.

Figure 12 SCP estimates summary

Fiscal year (to 30 June)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	LOM
Tonnes mined(kt)	--	--	--	1,000	2,500	2,500	2,500	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	**60,000**
Grade (ppm TREO)	--	--	--	700	1,000	900	732	732	732	732	732	732	732	732	732	**750**
Strip Ratio (waste:ore)	--	--	--	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
Ore sorter mass pull (%)	--	--	--	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	**80%**
Tonnes processed (kt)	--	--	--	800	2,000	2,000	2,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	**48,000**
Met recovery (% TREO excl Ce)	--	--	--	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	**60%**
TREO produced in MREC (t)	**--**	**--**	**--**	**420**	**1,500**	**1,350**	**1,099**	**2,197**	**2,197**	**2,197**	**2,197**	**2,197**	**2,197**	**2,197**	**2,197**	**27,000**
Nd_2O_3 (t)	--	--	--	71	252	227	185	369	369	369	369	369	369	369	369	**4,539**
Pr_6O_{11}(t)	--	--	--	18	65	58	48	95	95	95	95	95	95	95	95	**1,168**
Dy_2O_3 (t)	--	--	--	11	39	35	29	57	57	57	57	57	57	57	57	**701**
Tb_4O_7 (t)	--	--	--	2	7	6	5	10	10	10	10	10	10	10	10	**127**
Revenue ($/kg)	--	--	--	62	62	62	62	62	62	62	62	62	62	62	62	**62**
Cash cost ($/kg)	--	--	--	38	27	30	37	31	31	31	31	31	31	31	31	**31**
AISC ($/kg)	--	--	--	56	44	47	54	48	48	48	48	48	48	48	48	**48**
Growth Capex (US$m)	--	--	50	50	--	--	50	--	--	--	--	--	--	--	--	**150**
Sustaining Capex (US$m)	--	--	--	1	3	3	3	5	5	5	5	5	5	5	5	**69**
Revenue (US$m)	--	--	--	26	94	84	69	137	137	137	137	137	137	137	137	**1,687**
Op Costs (US$m)	--	--	--	(17)	(44)	(44)	(43)	(74)	(74)	(74)	(74)	(74)	(74)	(74)	(74)	**(910)**
EBITDA (US$m)	--	--	--	9	50	41	26	63	63	63	63	63	63	63	63	**778**
FCF (US$m)	**(4)**	**(4)**	**(52)**	**(44)**	**35**	**28**	**(32)**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**45**	**377**

Source: SCPe

Sensitivities: We analyse project Koppamurra NPV sensitivity to various inputs including Nd, Pr, Dy and Tb price, unit costs, inventory/grade, recovery and payability. The most sensitive inputs are price, recovery and payability. The NPV is less sensitive to unit costs due to low overall strip and mining costs. Additions to mine life are accretive, but head grade has a larger impact on NPV than tonnes.

Figure 13: Sensitivity summary

Koppamurra NPV7% (A$m)	Prices : -20.0%	-10.0%	flat	+10.0%	+20.0%
DR: 5.0%	84	144	204	264	325
DR: 6.0%	70	125	180	235	290
DR: 7.0%	57	108	**158**	209	260
DR: 8.0%	45	92	139	186	233
DR: 10.0%	26	66	107	147	187

Koppamurra NPV7% (A$m)	Mining: A$3.00/t	A$2.50/t	A$2.00/t	A$1.50/t	A$1.00/t
Processing: A$8.00/t	126	150	174	198	222
Processing: A$10.00/t	119	142	166	190	214
Processing: A$12.00/t	111	135	**158**	182	206
Processing: A$14.00/t	103	127	151	174	198
Processing: A$16.00/t	95	119	143	167	190

Koppamurra NPV7% (A$m)	Reserve: 40Mt	50Mt	60Mt	70Mt	80Mt
Grade: 550ppm	-29	-7	7	19	30
Grade: 650ppm	35	60	83	102	120
Grade: 750ppm	92	127	**158**	186	209
Grade: 850ppm	149	194	234	269	299
Grade: 950ppm	206	261	309	352	389

Koppamurra NPV7% (A$m)	Recov: 50.0%	55.0%	60.0%	65.0%	70.0%
Payability: 60%	64	75	86	97	107
Payability: 65%	101	111	122	133	144
Payability: 70%	137	148	**158**	169	180
Payability: 75%	173	184	195	206	216
Payability: 80%	209	220	231	242	253

Koppamurra NPV7% (A$m)	NdPr Prices : -20.0%	-10.0%	flat	+10.0%	+20.0%
DR: 5.0%	134	169	204	239	275
DR: 6.0%	115	148	180	212	245
DR: 7.0%	99	129	**158**	188	218
DR: 8.0%	84	112	139	167	194
DR: 10.0%	60	83	107	130	154

Koppamurra NPV7% (A$m)	DyTb Prices : -20.0%	-10.0%	flat	+10.0%	+20.0%
DR: 5.0%	154	179	204	229	254
DR: 6.0%	134	157	180	203	226
DR: 7.0%	116	137	**158**	179	201
DR: 8.0%	100	120	139	159	178
DR: 10.0%	73	90	107	123	140

Source: SCP; all NPVs shown at 7% discount rate, US$150/kg NdPr, US$500/kg Dy, US$2,200/t Tb unless directly sensitized

Downstream processing facility: AR3 plans to explore potential to build or participate in a downstream HREE separation facility. While we do not currently model this as our base case, we think this is a logical pursuit as AR3 will be one of few suppliers of high quality HREE enriched rare earth carbonates. For scenario analysis we show potential economics which assumes a 5ktpa facility producing ~1,500tpa of Dy and ~200tpa of Tb with 53% own feed (by TREO content) and US$6,000/t carbonate separation costs. Based on capex of US$100m (A$125m), we estimate NPV7% of A$145m and 24% IRR suggesting the project is attractive. The key hurdles are sourcing third-party carbonates and sizing the facility. Potential partners may include Northern Mineral's Nolans project.

Figure 14: SCPe downstream assumptions (not included in our base case estimates)

Fiscal year (to 30 June)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	Total
Material processed (kt)	--	--	--	--	3.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	**73.0**
Of which own material (%)	--	--	--	--	18%	38%	34%	28%	53%	53%	53%	53%	53%	53%	53%	**46%**
TREO produced	**--**	**--**	**--**	**--**	**2,088**	**3,600**	**3,578**	**3,540**	**3,705**	**3,705**	**3,705**	**3,705**	**3,705**	**3,705**	**3,705**	**53,325**
Nd_2O_3 (t)	--	--	--	--	569	654	639	843	678	678	678	678	678	678	678	**9,827**
Pr_6O_{11}(t)	--	--	--	--	144	165	161	213	172	172	172	172	172	172	172	**2,486**
Dy_2O_3 (t)	--	--	--	--	86	99	97	128	103	103	103	103	103	103	103	**1,492**
Tb_4O_7 (t)	--	--	--	--	11	12	12	17	14	14	14	14	14	14	14	**199**
Revenue (A$/kg)	--	--	--	--	100	74	83	108	87	87	87	87	87	87	87	**85**
Cash cost (A$/kg)	--	--	--	--	81	63	69	87	71	71	71	71	71	71	71	**70**
Capex	--	--	--	67	71	4	4	4	4	4	4	4	4	4	4	**203**
Revenue (A$m)	--	--	--	--	208	267	297	381	321	321	321	321	321	321	321	**4,529**
Op Costs (A$m)	--	--	--	--	(24)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	(40)	**(584)**
Material purchase (A$m)	--	--	--	--	(146)	(187)	(208)	(267)	(225)	(225)	(225)	(225)	(225)	(225)	(225)	**(3,171)**
EBITDA	--	--	--	--	38	40	49	74	56	56	56	56	56	56	56	**775**
EBITDA margin (%)	--	--	--	--	18%	15%	17%	20%	18%	18%	18%	18%	18%	18%	18%	**17%**
FCF (A$m)	**--**	**--**	**--**	**(67)**	**(43)**	**25**	**31**	**49**	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**350**

Source: SCPe; own material calculations by TREO contained; assumes 90% own MREC grade and 50% purchased MREC; op costs include MREC purchasing costs at 70% payability; revenue assumes 99% REO payability

Corporate and Financial Summary

Share structure: AR3 has 111.0m shares outstanding with 20.2 options and warrants at a weighted average exercise price of A$0.75/sh. We assume a total of A$55m to fund exploration, project evaluation, and the equity portion of Koppamurra project construction. We base our per share valuation on a fully-diluted, fully-funded assumed share count of 178.5m fully diluted, fully funded shares outstanding.

Funding assumptions: As the end of December 2021, AR3 had A$8.6m of cash and no debt. Funding for Koppamurra: We estimate A$100m of build capex, $10m of evaluation costs, A$8m of G&A, and A$8m of working capital to positive cash flow, creating a total external funding requirement of A$144m. We assume the asset is financed through A$60m of debt at a 5% cost of capital, and A$55m of equity between earlier funding for evaluation and mine build equity funding.

Financials: We forecast steady state EBITDA margins of 43% over our modelled operating horizon including 47% at mine level. we estimate steady state FCF per year of A$40-45m, which we think should sustain an A$600m or higher valuation, albeit after a period of investment. Net debt hits a peak of A$64m in FY26 ahead of steady state production; this is equivalent to 1.4x forward EBITDA. Returns on capital are attractive at 15-30% ROCE in the first ten years, averaging 22%.

Figure 15: SCPe cash flow and balance sheet estimates

Fiscal year (to 30 June)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Revenue (A$m)	--	--	--	20	95	86	70	140	140	140	140	140	140	140	140
EBITDA (A$m)	(3)	(2)	(4)	(1)	46	37	22	60	60	60	60	60	60	60	60
Net income (A$m)	(3)	(2)	(5)	(9)	21	15	5	26	27	28	29	30	30	30	31
EPS (A$/sh)	(0.023)	(0.013)	(0.029)	(0.055)	0.121	0.086	0.028	0.149	0.157	0.163	0.169	0.172	0.174	0.177	0.179
EBITDA margin (%)	--	--	--	*(4%)*	*48%*	*43%*	*31%*	*43%*	*43%*	*43%*	*43%*	*43%*	*43%*	*43%*	*43%*
Cash flow from ops (A$m)	(3)	(2)	11	(30)	26	23	17	35	44	46	47	47	47	48	48
Cash flow from investing (A$m)	(4)	(4)	(52)	(51)	(3)	(3)	(53)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
FCF (A$m)	(7)	(6)	(41)	(82)	23	21	(36)	30	40	41	42	42	43	43	43
FCFPS (A$/sh)	(0.047)	(0.035)	(0.241)	(0.474)	0.133	0.120	(0.210)	0.173	0.231	0.237	0.243	0.245	0.248	0.250	0.253
Net cash (A$m)	30	24	17	(64)	(41)	(21)	(57)	(27)	13	53	95	137	180	223	266
ND/NTM EBITDA (x)	--	--	--	1.4	1.1	1.0	0.9	0.4	(0.2)	(0.9)	(1.6)	(2.3)	(3.0)	(3.7)	(4.4)
Debt borrowed (repaid) (A$m)	--	--	40	40	--	(16)	(16)	(16)	(16)	(16)	--	--	--	--	--
Equity Raised (A$m)	25	--	35	--	--	--	--	--	--	--	--	--	--	--	--
Total assets (A$m)	35	33	118	141	159	156	144	157	168	180	209	238	268	299	330
Total liabilities (A$m)	1	1	57	88	85	68	52	38	22	6	6	6	6	6	6
Total equity (A$m)	34	32	62	52	73	88	93	119	146	174	203	232	262	293	324
Ending shares out (m)	148	172	172	172	172	172	172	172	172	172	172	172	172	172	172
ROCE (%)	(9%)	(6%)	(4%)	(3%)	27%	21%	10%	32%	30%	25%	21%	19%	16%	15%	13%
ROIC (%)	(77%)	(25%)	(9%)	(4%)	33%	26%	9%	30%	32%	36%	40%	45%	52%	62%	75%
ROE (%)	(9%)	(6%)	(8%)	(18%)	29%	17%	5%	22%	19%	16%	14%	13%	11%	10%	10%
Mine EBITDA (A$m)	--	--	--	12.7	68.3	56.1	35.6	87.3	87.3	87.3	87.3	87.3	87.3	87.3	87.3

Source: SCPe

ESG: Community and landowner relations are one of the three key pillars of AR3's strategy and we think the company's credentials are strong with low impact mining and processing, ability to completely rehab project areas, and strong management commitment to ESG principles. The company publishes an annual sustainability report and detailed governance policies.

Environmental: AR3 is committed to full restoration of the project area. Washed clay rehabilitation is an established farming practice and can improve land productivity. Project water and acid will be recycled and a permanent waste or tailings facility is unlikely to be necessary in our view. A groundwater study is commencing in 2Q22 and groundwater maintenance is a major priority for AR3.

Social: AR3's Community and Land Manager is resident in Naracoorte and maintains frequent dialogue with local landowners and stakeholders. Operations are planned to be drive in/drive out with operators living in local communities, thus the operations should have a tangible benefit to employment and shared economic benefits in the local communities. Native Title claims have been extinguished on the private land where exploration is active.

Governance: The board current consists of five members, including a non-Executive Chairman (Dudley Kingsnorth), MD Don Hyma, Technical Director Rick Pobjoy, and NEDs Bryn Jones and Pauline Carr. Ms Carr brings extensive board and governance experience and also serves as Chancellor of the University of South Australia, the Chairman of the Board of National Pharmacies, Chair of the Minerals and Energy Advisory Council and an NED of Highfield Resources (ASX:HFR).

Figure 16: (A) AR3 exhibit at Southeast Field Day; (B) Drilling at Koppamurra showing topography; inset aerial of town of Naracoorte, SA

Source: Australian Rare Earths, Google Images

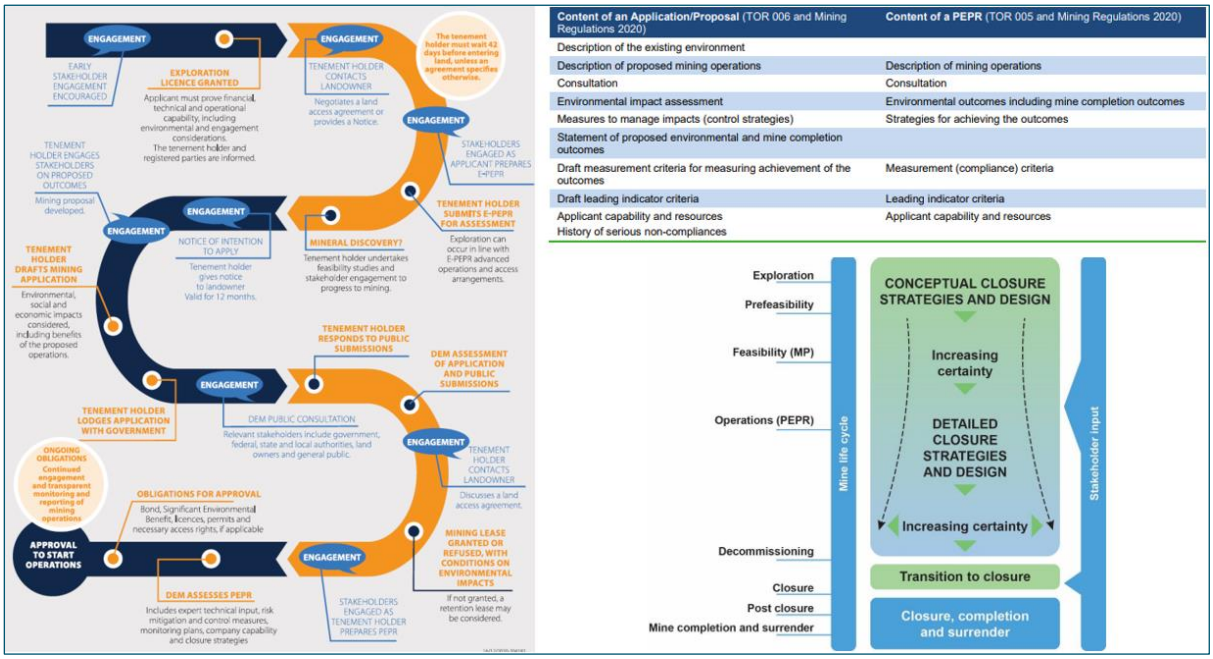
Government and stakeholders:

Ownership: Koppamurra is 100% owned by AR3 in four tenements totalling 3,354km^2 in South Australia and one adjoining tenement totalling 677km^2 in Victoria. The tenements are currently held in exploration permit status. Current exploration activities are being conducted on private land where native title has been extinguished.

Royalties and Tax: The corporate profit tax rate Australia is 30%. The applicable royalty rate is 3.5% in South Australia and 2.75% in Victoria and there is a 0.5% private NSR due to Director Bryn Jones and Rickie Pobjoy.

Permitting: The permitting process is carried out at the state level, in this case South Australia. South Australia is a mature mining jurisdiction host to large producing operations such as BHP's polymetallic Olympic Dam (copper, uranium, silver, zinc) and Heathgate's Beverley ISR uranium facility, thus the state regulators have practical experience with key issues such as fiscal and legal structures, operations, ground water restoration, radionuclides (though not an issue in this case) and tailings management. The process includes consultation with landholders and stakeholders, comment periods, and preparation of a program for environmental protection and rehabilitation (PEPR). Given the low impact nature of operations, and the fact that exploration is on private lands where native title has been extinguished (though there are native title claims elsewhere on the relevant tenements), we believe that permitting can be achieved within an 18-24-month timeframe.

Figure 17: South Australia permitting and PEPR guidelines and conceptual mine regulatory framework



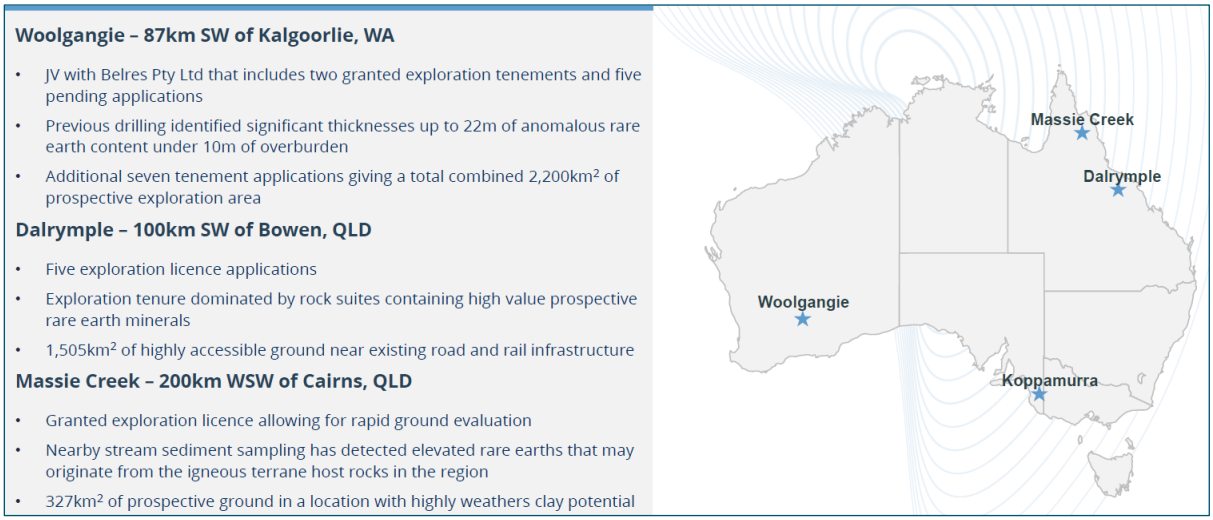
Content of an Application/Proposal (TOR 006 and Mining Regulations 2020)	Content of a PEPR (TOR 005 and Mining Regulations 2020)
Description of the existing environment	
Description of proposed mining operations	Description of mining operations
Consultation	Consultation
Environmental impact assessment	Environmental outcomes including mine completion outcomes
Measures to manage impacts (control strategies)	Strategies for achieving the outcomes
Statement of proposed environmental and mine completion outcomes	
Draft measurement criteria for measuring achievement of the outcomes	Measurement (compliance) criteria
Draft leading indicator criteria	Leading indicator criteria
Applicant capability and resources	Applicant capability and resources
History of serious non-compliances	

South Australia Department of Mines and Energy

Other projects:

AR3 has also targeted additional projects in WA and QLD that are prospective for weathered clay REE mineralization. We currently hold these in NAV at A$25m.

Figure 18: AR3s earlier-stage Australian REE exploration projects



Source: Australian Rare Earths

Risks

Geological: This is relatively low risk as material is near surface and can be infill drilled at low cost.

Mining: In our view mining is low risk as ore is free dig with minimal overburden. Material handling efficiency will be important as mining is laterally intensive and progressive backfill is also planned, but Australian mining contractors are well regarded.

Development: We think risks are low with good infrastructure, topography, climate and with modest build scope. The main risk is availability and cost of skilled labour in the current environment.

Processing/Metallurgy: Met tests indicated 44-68% recovery which is within acceptable ranges. The key risk is reagent consumption due to the presence of carbonate materials; this may be addressed by size screening, hydrocycloning and/or flotation.

Infrastructure: We view this as low risk with paved road access, good climate and topography and significant mining support service availability in South Australia and Victoria.

Environmental: The mine itself is shallow and should be progressively rehabilitated; therefore, we believe the risks, are moderate. Long term land impact should be low as the topography can be restored with the original material with no long term waste rock storage and a moderate sized tailings storage facility.

Political and Social: There are acknowledged Native Title Claims over areas covered by the tenements but current exploration activities are being conducted on private land where native title has been extinguished. AR3 maintains good relations and access agreements with the local landholders; the current land use is primarily agriculture.

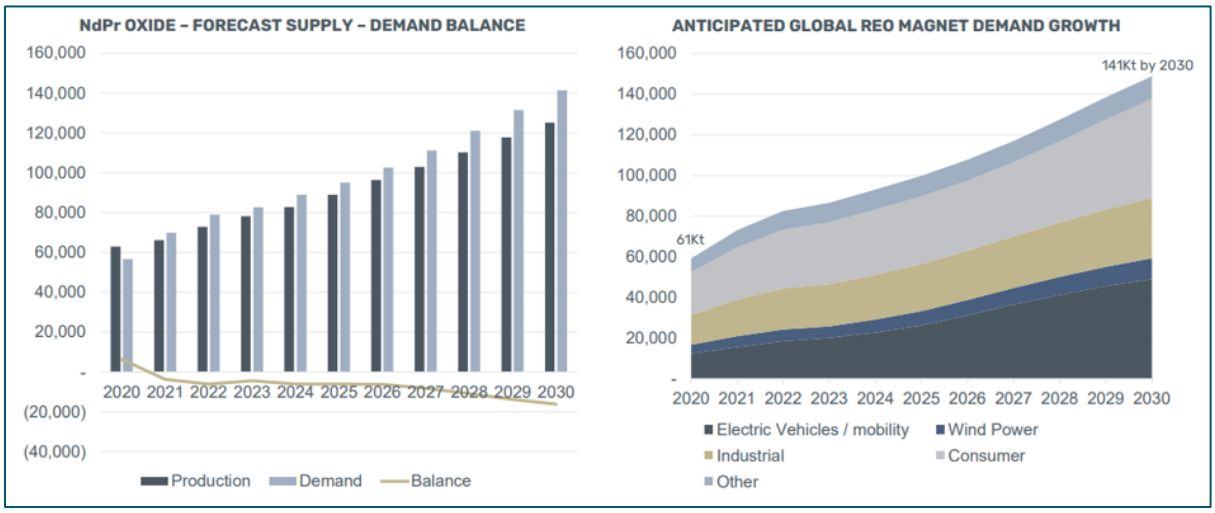
Appendix: Rare Earths Overview

Rare earths elements (REEs) consist of the lanthanide group (atomic numbers 57 to 71 in the periodic table). **Neodymium (Nd) and praseodymium (Pr)** are the key rare earths for the majority of prospective development assets, comprising 15-25% of the REO assemblage but >60% of the economic value of most development. The key end uses for Nd and Pr are high-powered magnets, which are essential components of electric vehicles, mobile electronics, and wind turbines. The most important deposits are bastnaesite and monazite deposits which are associated with carbonatites and/or alkali igneous processes. These deposits are most commonly found in rift settings and are associated with alkaline intrusions.

Outlook

While REEs are used for an array of end uses, the strategic focus has been on REEs used for permanent magnets. The most important of these are neodymium and praseodymium (~US$160/kg currently). An average EV uses 1-3kg of NdPr oxide and 200kg of NdPr oxides are currently installed per 1MW of new wind turbine generating capacity.

Figure 19: NdPr supply/demand balance and REO magnet demand growth



Source: Adamas Intelligence

The heavy rare earths have smaller markets due to their scarcity in economic concentrations. Due to their high prices, **terbium** (~US$2,200/kg) and **dysprosium** (~US$500/kg) can be important by-product sources of economic value. **Dysprosium** and **holmium** (~$310/kg) have the highest magnetic strength of any elements but are more temperature sensitive than NdPr. The light rare earths, **lanthanum** and **cerium** are more abundant in economic deposits (commonly ~65-70% of total REO content by weight) are used in fluorescent applications. They are only a secondary component of the economic value of a typical deposit due to their lower prices (~US$5/kg). **Samarium europium** and **gadolinium** are typically sold as a mixed concentrate product, typically up to 5% of deposit value.

Geology

While rare earths occur in hundreds of naturally occurring minerals, economically mineable concentrated REE deposits are associated with carbonatites, which tend to occur in rift zones of crustal extensions, and alkaline enriched igneous magmas. Many of the most important mines and development projects are carbonatites. These include the Bayan Obo, Weishan, Maoniuping and Daluxiang mines in China, the Mt Weld mine in Australia and the Mountain Pass mine in California. According to USGS, roughly 40% of known carbonatites globally are in Africa in the east African and southern African rift zones. Other important ore sources include ionic clay deposits in Southern China and Vietnam, which are an important source of medium and heavy REEs. Peralkaline igneous are an emerging potential new source of production and are enriched in heavy REEs.

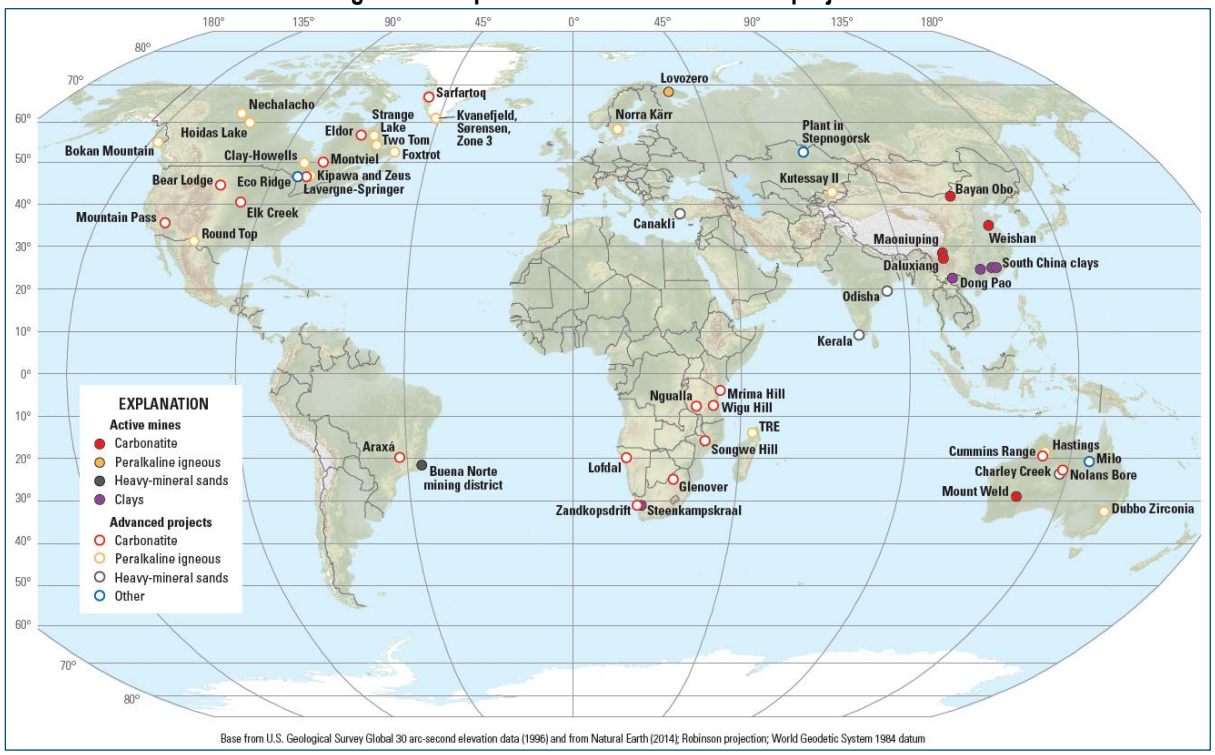
Mineralogy

Ionic clay deposits are the most important source of heavy and medium REEs. They typically occur in tropical high rainfall environments under thick laterite soils. The REEs are leached from underlying granites by groundwater and are weakly adsorbed onto clay minerals near the intensely weathered zones. Though typically low grade, the REEs are soluble with weak acid and therefore can be extracted cheaply. The best known production sources are the small mines of southern China (Jiangxi, Hunan, Fujian, Guangdong and Guangxi Provinces) and Vietnam's Dong Pao mine. There is limited publicly available information or study of the producing mines but USGS reports that deposit grades are between 300 to 2000ppm. According to USGS, the key factors behind their economic viability are i) acid solubility even in weak acid; ii) enrichment in heavy REEs; iii) labour costs; iv) localized lower environmental standards.

Bastnaesites (a fluoro-carbonate, (Ce, La, Y)CO_3F) contain low levels of uranium and thorium and are simpler to process. They are often a most significant source of REEs in carbonatite-related deposits. They are of hydrothermal origin and typically occur as fine-grained or clay masses in vugs, microfractures and veinlets and are associated with quartz, fluorite, strontianite, barite and hematite.

Monazites (a phosphate, (Ce, La, Nd, Pr, Th, Sm, Gd)PO_4) are an important REE bearing mineral and are present in carbonatite related orebodies, in alluvial/placer accumulations and accumulations in mafic gneiss. Due to their high density, monazites originating from weathered pegmatites can accumulate in mineral sands deposits. In the 1960s placer monazite deposits were the main source of REE production but fell out of favour due to concern over radioactive thorium and, to a lesser extent, uranium gangue. Xenotime (YPO_4) is the main ore mineral for yttrium and is typically associated with monazite REE mineralization.

Figure 20: Map of REE mines and advanced projects



Source: USGS 2016

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