



## Securing supply of critical minerals for the global energy transition

2024 IMARC Global I Project Spotlight I Goschen Rare Earths and Mineral Sands Project

**ASX:VHM**

### **Acknowledgement of Country**

*VHM acknowledges the Australian Aboriginal and Torres Strait Islander peoples as the first inhabitants of the nation and the traditional custodians of the lands where we live, learn and work. We pay our respects to past, present and emerging Elders.*



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## Compliance Statement

The information in this presentation that relates to the Goschen DFS refresh and the Mineral Resource and Ore Reserve estimates were reported in the ASX announcement dated 28 March 2023. The Cannie Mineral Resource estimate was reported in the ASX announcement dated 16 May 2023 and the Area 4 Ore Reserve estimate was reported in the ASX announcement dated 29 September 2023. The Nowie Mineral Resource estimate was first reported in the ASX announcement dated 24 January 2024. The Company confirms that it is not aware of any new information or data that materially affects the matters previously reported and that all material assumptions and technical parameters underpinning the Mineral Resources and Ore Reserves estimates and forecast financial information derived from the production target in the relevant market announcements continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Persons' findings are presented and have not been materially modified.



# VHM Limited (ASX:VHM) overview

## Corporate Snapshot

### Market Cap<sup>1</sup>

A\$67.66 million

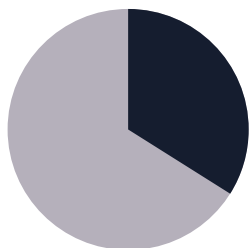
### Share Price

A\$0.42

### Issued Shares

216,460,297

### Top 20 Shareholders



Top 20: 34%  
Ellison WA: 8.9%

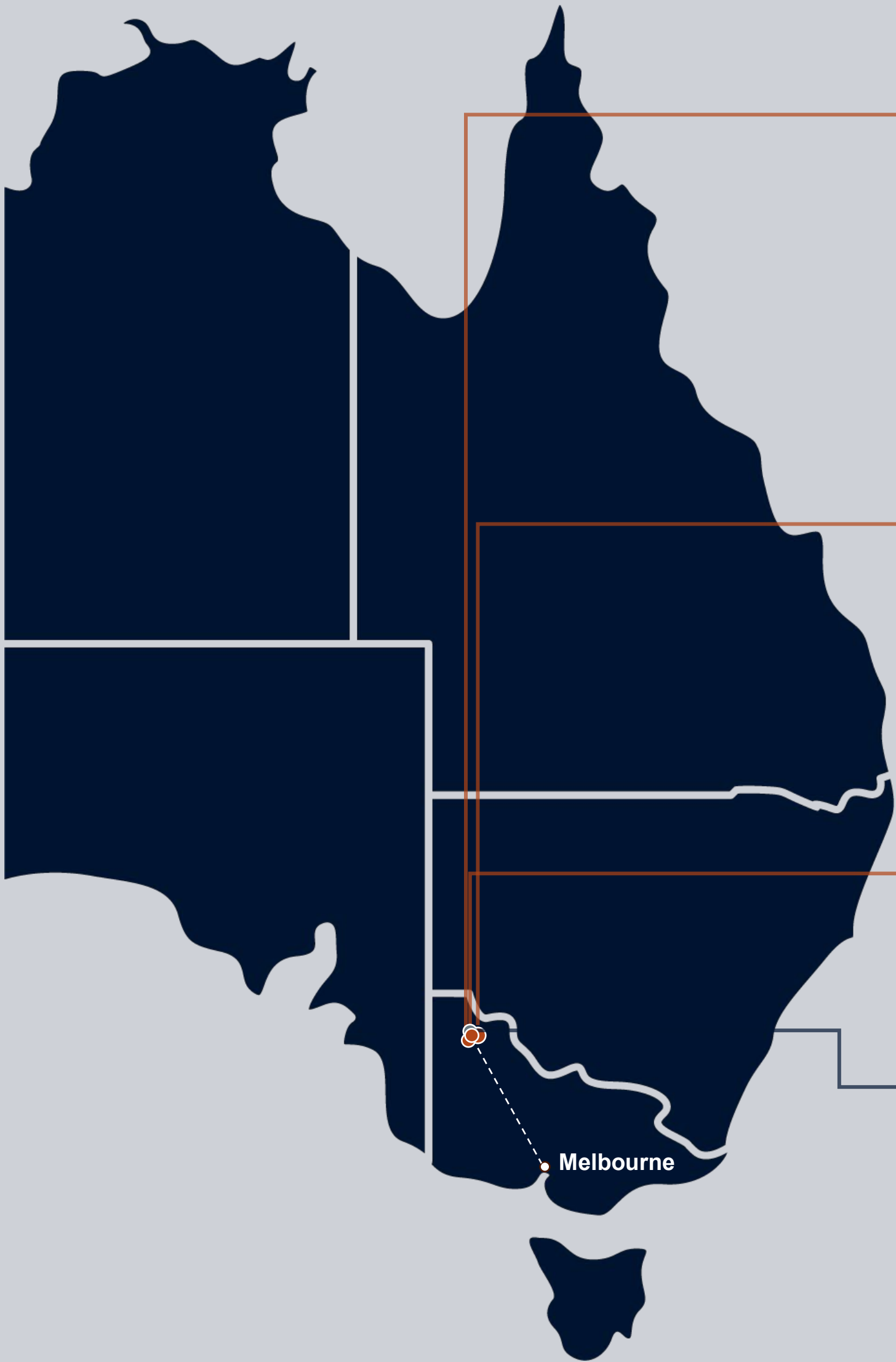
### Cash<sup>2</sup>

A\$5.4 million

### Share Options

8,127,186

Australian owned rare earths and mineral sands  
mine and processing developer



### GOSCHEN PROJECT<sup>3</sup>

98.8Mt ORE @ 4.0% THM  
Zircon 23.6%, Rutile 9.9%,  
Mon 3.7%, Xen 0.7%

### CANNIE PROJECT<sup>4</sup>

192Mt MRE @ 3.1% THM,  
Zircon 24.5%, Rutile 15.5%,  
Mon 4.1%, Xen 0.8%

### AREA 4 ORION PROJECT<sup>5</sup>

11.5Mt ORE @ 5.6% THM,  
Zircon 19.6%, Rutile 12.2%,  
Mon 3.0%, Xen 0.7%

### NOWIE PROJECT<sup>6</sup>

16.4Mt MRE @ 3.8% THM,  
Zircon 16.1%, Rutile 15.6%,  
Mon 2.1%, Xen 0.5%

Notes:  
(1): Market data at 29 October 2024 and sourced from the ASX  
(2): Cash position reported on 29 October 2024 to the ASX  
(3): See Company ASX release dated 28 March 2023  
(4): See Company ASX release dated 16 May 2023  
(5): See Company ASX release dated 29 September 2023  
(6): See Company ASX release dated 24 January 2024



# Highlights

Emerging Tier 1 integrated rare earth and minerals sands project with globally significant mineral assemblage



**Construction ready with pathway to production:** in anticipation of primary approval.

**Simple operating methodologies:** Shallow-pit mined via truck-shovel with conventional processing flowsheet for Phase 1 (Base Plant).

**Dual commodity asset:** generates revenue from two independent product streams with rare earths *and* zircon and titanium.

**Compelling mineral assemblage and mineralisation:** a unique orebody with both light (NdPr) *and* heavy (DyTb) rare earths mineralised in sands.

**Advanced Approvals:** All Goschen environmental and social assessments complete | EES public inquiry and evaluation stages complete | Recommendation report prepared for the Minister for Planning to determine an outcome<sup>1</sup>.

**100% land ownership:** VHM has acquired all land required for the Goschen Project footprint<sup>2</sup>.

Notes:

(1) See Company ASX release dated 3 July 2024

(2) See Company ASX release dated 3 October 2023



# Accelerating Goschen towards production

Extensive development works complete

## Definitive Feasibility Study

**Refreshed**

20–25-year Life of Mine  
| NPV A\$1.525B | IRR 44% | Low Capex |  
Payback 2.8 years<sup>1</sup>

## Goschen Environment Approval

**Report with the Minister**

Independent recommendations report  
on the Goschen primary approval  
assessment<sup>3</sup>

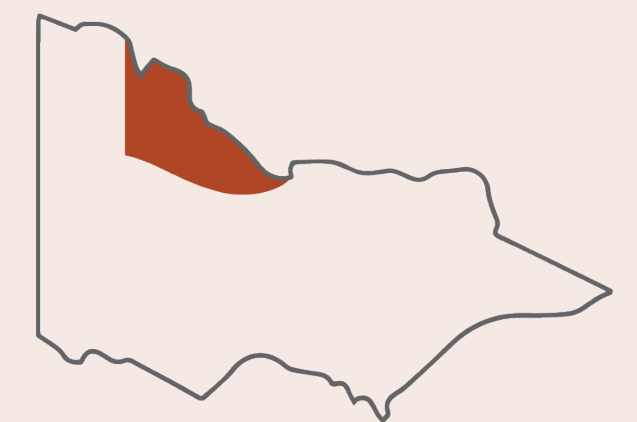
## 30% Capex Reduction for Goschen Base Plant

**Achieved**

With inputs from Base Plant detailed engineering  
design & principal mining services partners.<sup>5</sup>

## Extensive Exploration Drill Program

**Discovered  
a major new Critical  
Minerals Province**



55km stretch of contiguous  
resource confirmed in north  
west Victoria<sup>7</sup>.

**Accelerating Goschen to targeted first production in Q1 2026**

**Goschen is now Australia's  
lowest capital rare earths project**

## Pilot-scale Hydromet Plant

**Produced high-purity rare  
earth carbonate**

Market leading recoveries achieved at ANSTO,  
producing a mixed rare earth carbonate  
product<sup>2</sup>

## First Binding Offtake

**Secured**

For Base Plant products (Phase 1)  
Indicating quality of Goschen Project's  
commercial products<sup>4</sup>

## Mining Services Partner

**Appointed**

Victoria-based Yellow Iron Fleet<sup>6</sup>

**Deposit scale offers  
future upside.**

Notes:

(1) See Company ASX release dated 28 March 2023  
(2) See Company ASX release dated 6 June 2023  
(3) See Company ASX release dated 3 July 2024

(4) See Company ASX release dated 31 January 2024  
(5) See Company ASX release dated 17 June 2024  
(6) See Company ASX release dated 28 May 2024  
(7) See Company ASX release dated 16 May 2023

# Goschen permitting pathway

Approvals milestones achieved

## Primary Approval (EES)

Source: Engage Victoria website

Q4 2023

Victorian Minister for Planning approved public exhibition for Goschen EES<sup>1</sup>

Exhibition stage: Public Submissions<sup>2</sup>

20 November 2023 – 17 January 2024

Q1 2024

Hearing stage: Directions Hearing

Tuesday 13 February 2024

Hearing stage: Public Hearing<sup>3</sup>

25 March 2024 – 30 April 2024

Q2 2024

Report stage: IAC Panel reports back to Planning Minister<sup>4</sup>

27 June 2024

Approval stage: Ministerial recommendation

## Secondary Approvals (Work Plans, Mining Licence)

Statutory advertising for the Goschen **Mining Licence application** executed January 2024<sup>3</sup>

**We are here**

Work Plan Development (inc. compliance requirements with any conditions determined by the Minister)

**Mining Licence application assessed by Earth Resources Regulator**

Notes:

- (1) See ASX release dated 1 November 2023
- (2) See ASX release dated 14 November 2023
- (3) See ASX release dated 24 January 2024
- (4) See ASX release dated 3 July 2024

# Goschen Project highlights

The DFS Refresh<sup>1</sup> demonstrates the Goschen Project economics to be compelling



**5Mtpa**

**>20 years**

Conventional open cut mining methods excavation, load and haul



**8.5ktpa**

**MREC**

Target annual production rates for mixed rare earth carbonate (MREC)



**9.4ktpa**

**REMC**

Target annual production rates for rare earth mineral concentrate (REMC)



**134.5ktpa**

**HMC**

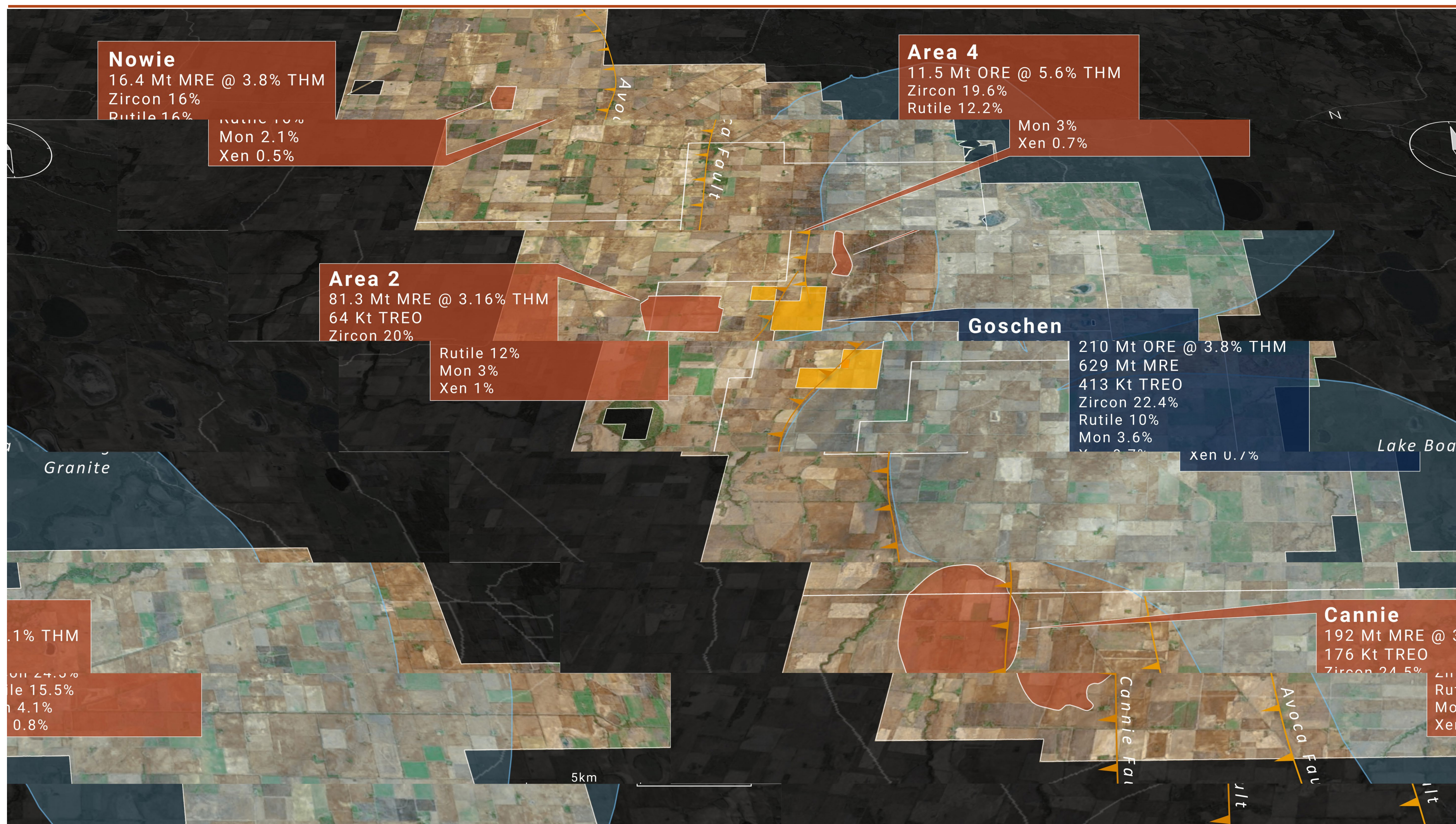
Target annual production rates for zircon/titania heavy mineral concentrate (HMC)

5Mtpa Goschen Project DFS Financial Metrics (Phase 1 and 1A)			
Pre-tax NPV10 (A\$ m)			1,525
Pre-tax IRR			44%
Payback from commencement of production (years)			2.8
Ore Reserve LoM (years)			20.5
Average ore grade (THM)			4.0%
Average strip ration (waste : ore)			2.6 : 1
First 10 Years of Mine	Average Production (tpa)	REMC	9,428
		MREC	8,568
		Zircon-titania HMC	134,500
	Average revenue per annum (A\$ m)		564
	Average opex per annum (A\$ m)		273
	Average EBITDA per annum (A\$ m)		291
	Average unlevered, pre-tax FCF per annum (A\$ m)		270
	Average revenue A\$/t ore		118
	Average operating costs A\$/t ore		57
	Payback period (years)		2.8



# Company Mineral Resources & Reserves

VHM's assets in Victoria's critical minerals province at 30 June 2024



**892 Mt<sup>1</sup>**  
Mineral Resources  
estimate

**650 Kt<sup>1</sup>**  
TREO + Y<sub>2</sub>O<sub>3</sub>

**210 Mt<sup>2</sup>**  
Ore Reserves

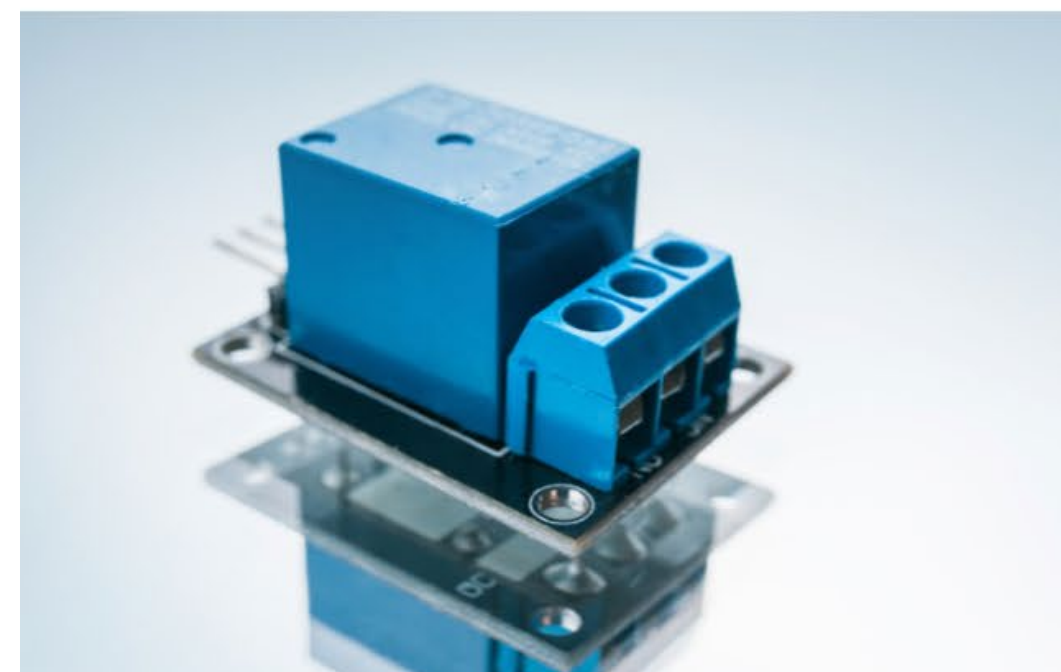
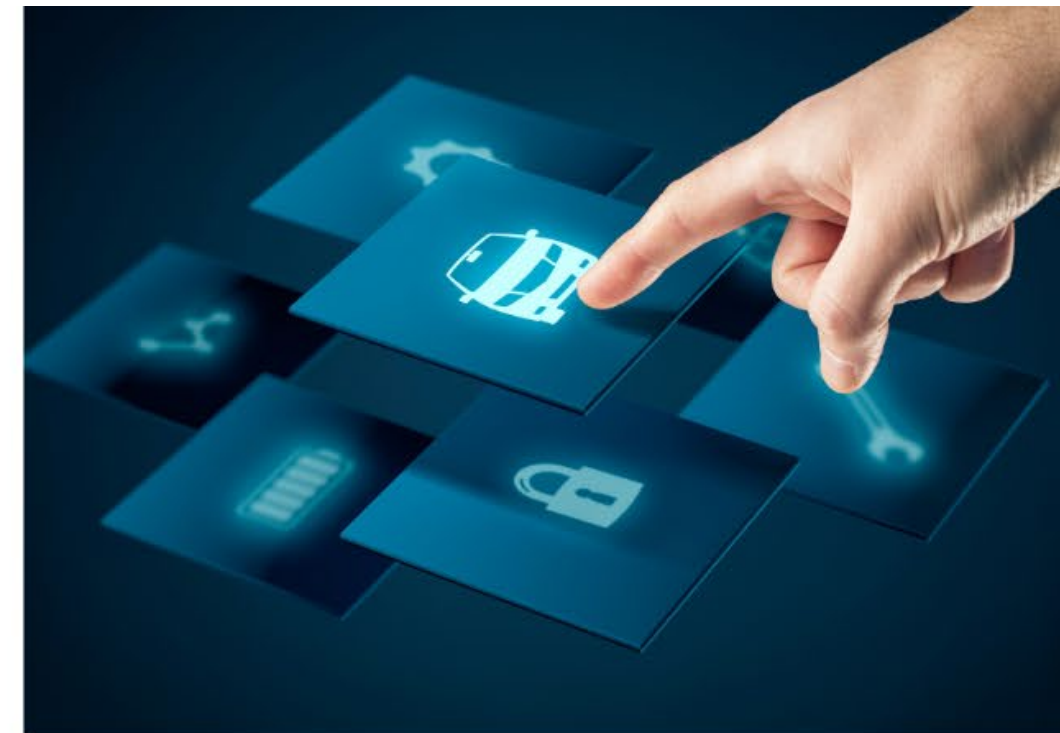
Notes:  
(1): Company Mineral Resources estimate at 30 June 2024  
(2): Company Global Reserves last updated and released 29 September 2023



# Rare earths driving the energy transition

## 10x new

rare earth mines required by 2030  
to meet demand for permanent  
magnets



## End uses

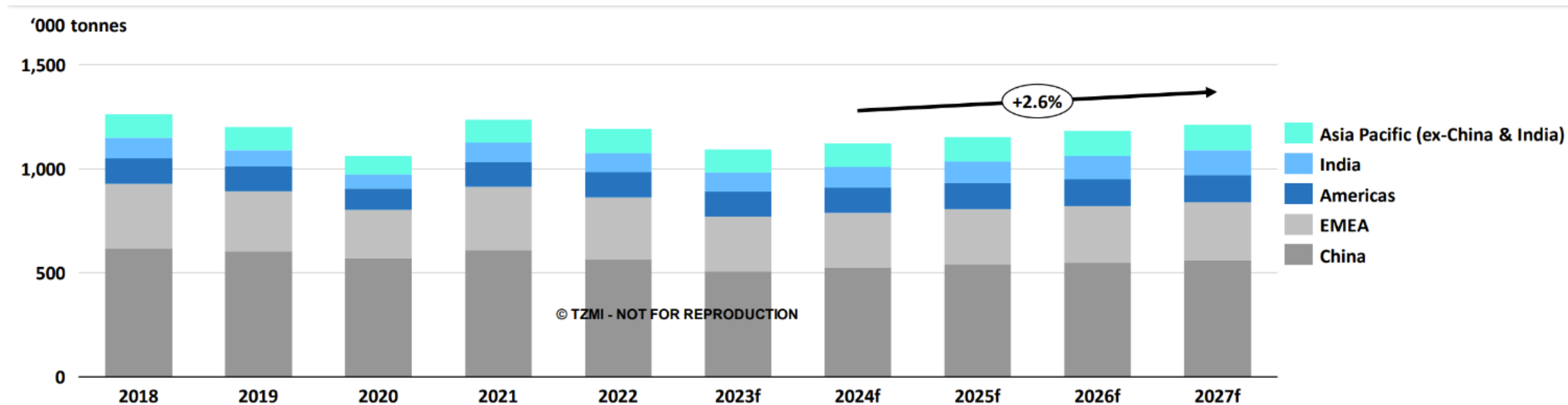
- 32%** Electric vehicles
- 28%** Wind turbines and industry motors
- 14%** Mobile phones and other communication devices
- 12%** Laptops and digital cameras
- 10%** Electromagnetic relay electronic controller sensor
- 4%** Medical devices and other medical equipment



# Urbanisation has a long way to go

## Forecasted demand zircon

### Forecast demand for zircon sands by region

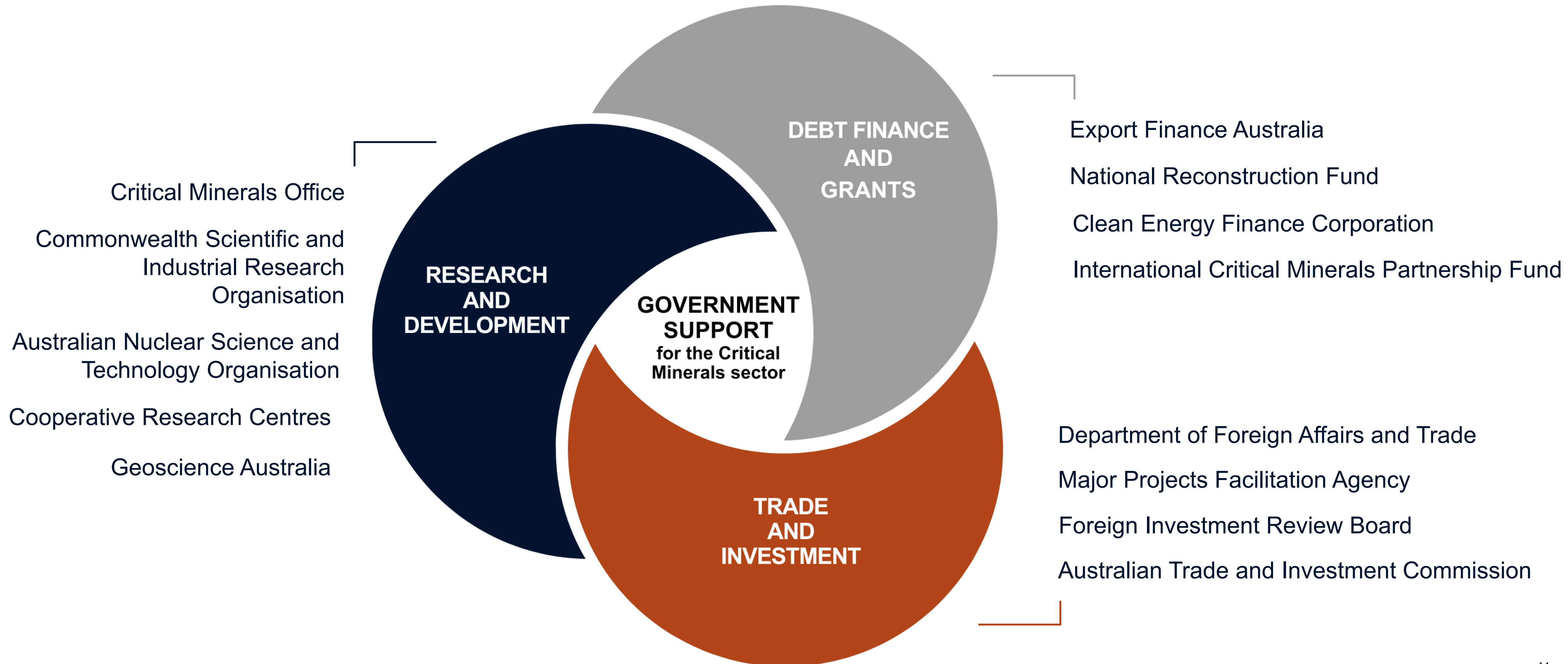


- Zircon prices have remained relatively stable at ~US\$2,000/tonne.
- TZMI expects long-term global zircon demand to grow at 2.6% per annum with India, the Americas and other Asia Pacific markets expected to be the long-term key growth drivers.
- Growth drivers include urbanization in emerging economies such as India and Southeast Asia, decarbonisation and renovation trends for developed economies.





# The Australian Government is backing the critical minerals sector



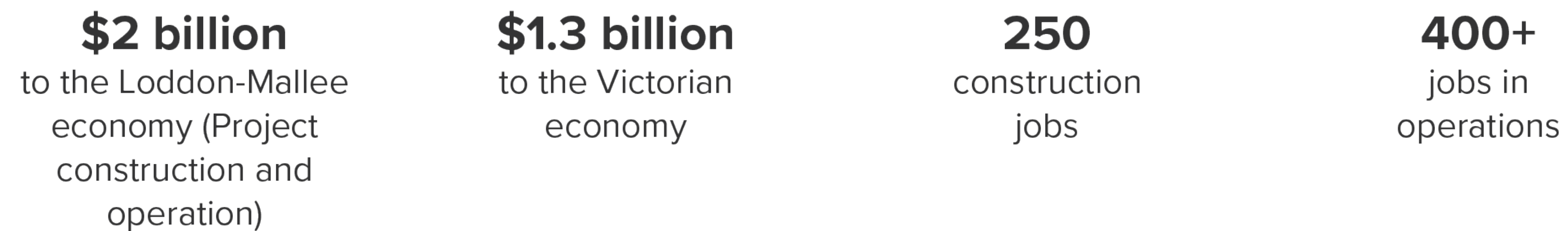


# Benefit sharing



## Local & State Benefits

The Project will bring significant benefits to the local community:



Source Deloitte Access Economics Report 2022, in Australian dollars



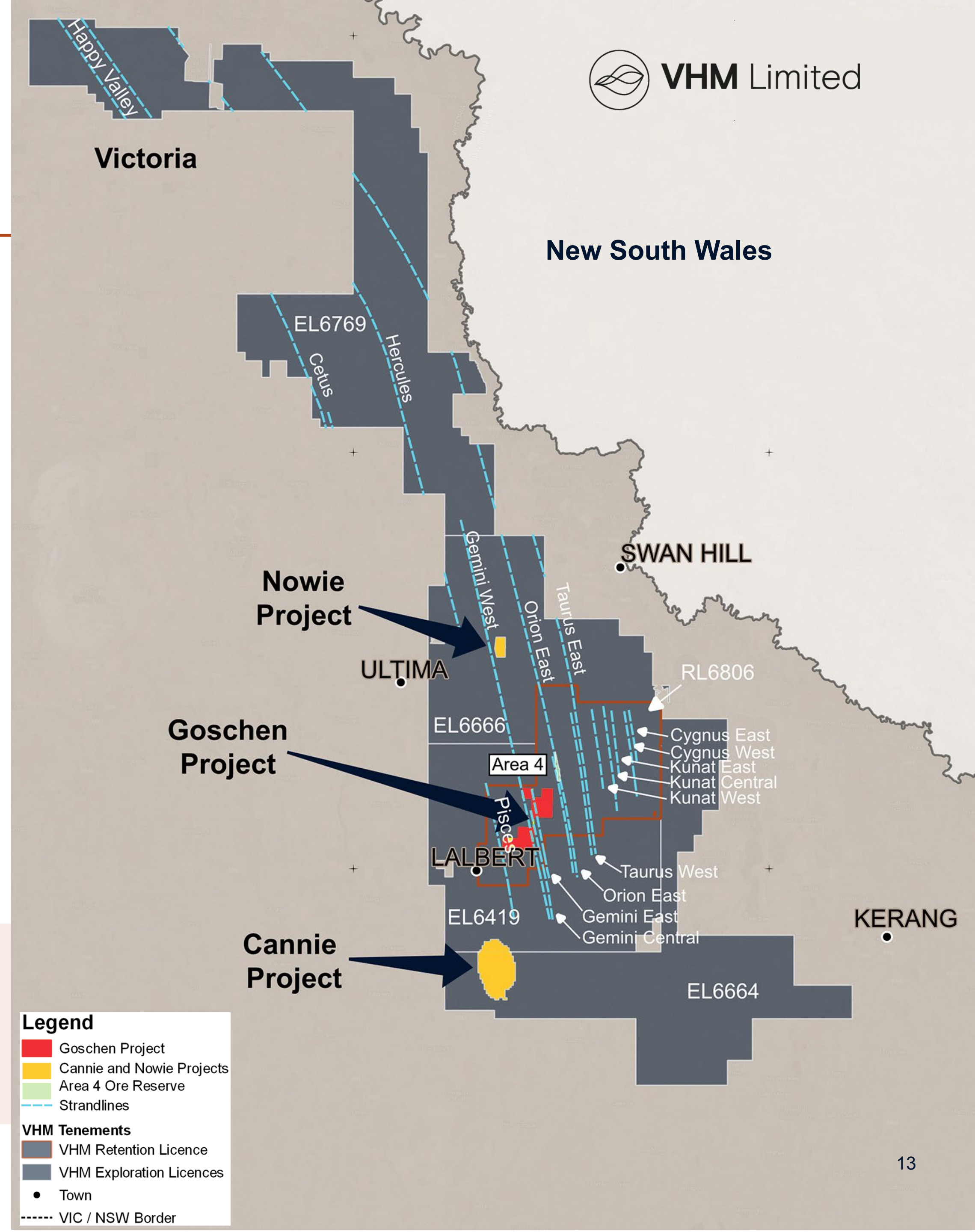


# Future opportunities

## High-grade strandlines

- 21 strandlines identified by processing historic data<sup>1</sup>.
- VHM drilling in targeted strandlines identified high-grade, near-surface THM.
- As part of its future exploration program, VHM will continue to target identified high-grade strandlines.

Several high-grade strandline prospects exist in VHM tenements





# Appendix A. JORC Tables



# Company Mineral Resources

## 892.1 Mt Mineral Resource estimate

	Area	Mineral Resource Category	Material	In Situ THM	Bulk Density	Total Heavy Mineral (THM)	Slimes	Oversize material >2mm	THM Assemblage <sup>(4)</sup>						Rare Earth Oxides															
									Zircon	Rutile	Leucoxene	Ilmenite	Monazite	Xenotime	La <sub>2</sub> O <sub>3</sub>	CeO <sub>2</sub>	Pr <sub>6</sub> O <sub>11</sub>	Nd <sub>2</sub> O <sub>3</sub>	Sm <sub>2</sub> O <sub>3</sub>	Eu <sub>2</sub> O <sub>3</sub>	Gd <sub>2</sub> O <sub>3</sub>	Tb <sub>4</sub> O <sub>7</sub>	Dy <sub>2</sub> O <sub>3</sub>	Ho <sub>2</sub> O <sub>3</sub>	Er <sub>2</sub> O <sub>3</sub>	Tm <sub>2</sub> O <sub>3</sub>	Yb <sub>2</sub> O <sub>3</sub>	Lu <sub>2</sub> O <sub>3</sub>	Y <sub>2</sub> O <sub>3</sub>	TREO + Y <sub>2</sub> O <sub>3</sub>
			(Mt)	(Mt)	(gcm3)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	
Goschen	Area 1	Measured	30.7	1.8	1.76	5.7	15	5	29.9	10.8	9.0	24.7	4.3	0.8	0.48	0.96	0.11	0.38	0.07	0.004	0.06	0.01	0.07		0.05	0.01	0.05		0.47	2.72
		Indicated	62.2	1.4	1.72	2.3	18	2	26.6	11.5	9.2	25.0	4.6	0.9	0.53	1.11	0.12	0.46	0.08	0.004	0.07	0.02	0.07		0.05	0.01	0.05		0.48	3.04
		Total <sup>(1)</sup>	92.9	3.2	1.73	3.4	17	3	27.7	11.2	9.1	24.9	4.5	0.8	0.51	1.06	0.12	0.43	0.08	0.004	0.07	0.02	0.07		0.05	0.01	0.05		0.48	2.94
	Area 3	Indicated	204.1	6.9	1.73	3.4	19	3	19.2	9.0	8.0	25.0	3.2	0.6	0.36	0.78	0.09	0.33	0.06	0.003	0.05	0.01	0.05		0.04	0.01	0.04		0.37	2.19
		Inferred	287.7	6.7	1.72	2.3	18	3	17.2	8.7	7.5	22.7	2.9	0.5	0.35	0.76	0.08	0.31	0.06	0.003	0.05	0.01	0.05		0.03	0.01	0.03		0.36	2.10
		Total <sup>(1)</sup>	491.8	13.6	1.73	2.8	18	3	18.2	8.9	7.7	23.9	3.0	0.6	0.36	0.77	0.09	0.32	0.06	0.003	0.05	0.01	0.05		0.03	0.01	0.04		0.36	2.14
	Area 2	Indicated	75.5	2.39	1.73	3.2	21	7	20.51	12.60	9.5	23.1	3.4	0.7	0.41	0.88	0.10	0.37	0.07	0.00	0.06	0.01	0.06	0.01	0.04	0.01	0.05	0.00	0.42	2.48
		Inferred	5.74	0.18	1.73	3.1	21	8	19.32	10.15	7.6	21.7	3.6	0.6	0.45	0.95	0.11	0.39	0.07	0.00	0.06	0.01	0.06	0.01	0.04	0.01	0.04	0.01	0.40	2.62
		Total <sup>(3)</sup>	81.3	2.6	1.7	3.2	21	7	20.4	12.4	9.4	23.0	3.4	0.7	0.4	0.9	0.1	0.4	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4	2.5
	Area 4	Indicated	18.0	0.8	1.74	4.6	20	5	19.0	11.0	10.0	24.0	3.0	1.0	0.32	0.67	0.07	0.28	0.05	0.002	0.05	0.01	0.05		0.03	0.01	0.04		0.33	1.91
		Total <sup>(3)</sup>	18.0	0.8	1.74	4.6	20	5	19.0	11.0	10.0	24.0	3.0	1.0	0.32	0.67	0.07	0.28	0.05	0.002	0.05	0.01	0.05		0.03	0.01	0.04		0.33	1.91
	Cannie	Inferred	192	5.9	1.70	3.1	19	6	24.5	15.5	24.3	2.1	4.1	0.8	0.49	1.06	0.12	0.45	0.08	0.004	0.07	0.01	0.07	0.02	0.05	0.01	0.05	0.01	0.49	3.00
		Total <sup>(2)</sup>	192	5.9	1.70	3.1	19	6	24.5	15.5	24.3	2.1	4.1	0.8	0.49	1.06	0.12	0.45	0.08	0.004	0.07	0.01	0.07	0.02	0.05	0.01	0.05	0.01	0.49	3.00
	Nowie	Inferred	16.4	0.6	1.73	3.8	19	5	16.1	15.5	24.4	5.0	2.1	0.5	0.28	0.61	0.07	0.26	0.05	0.003	0.04	0.01	0.05	0.01	0.04	0.01	0.04	0.01	0.33	1.80
		Total <sup>(3)</sup>	16.4	0.6	1.73	3.8	19	5	16.1	15.5	24.4	5.0	2.1	0.5	0.28	0.61	0.07	0.26	0.05	0.003	0.04	0.01	0.05	0.01	0.04	0.01	0.04	0.01	0.33	1.80
	Grand Total	Measured	30.7	1.8	1.76	5.7	15	5	29.9	10.8	9.0	24.7	4.3	0.8	0.48	0.96	0.11	0.38	0.07	0.004	0.06	0.01	0.07		0.05	0.01	0.05		0.47	2.72
		Indicated	359.8	11.5	1.73	3.2	19	4	20.4	10.2	8.6	24.5	3.4	0.7	0.39	0.83	0.10	0.35	0.06	0.003	0.05	0.01	0.05	0.00	0.04	0.01	0.04	0.00	0.39	2.34
		Inferred	501.6	13.3	1.71	2.7	18	4	20.4	12.0	15.7	12.8	3.4	0.7	0.41	0.89	0.10	0.37	0.07	0.003	0.06	0.01	0.06	0.01	0.04	0.01	0.04	0.00	0.42	2.49
		TOTAL <sup>(6)</sup>	892.1	26.6	1.7	3.0	18	4	21.0	11.2	12.2	18.7	3.4	0.7	0.41	0.87	0.10	0.36	0.07	0.003	0.06	0.01	0.06	0.00	0.04	0.01	0.04	0.00	0.41	2.44

Notes: Any discrepancies in totals are a function of rounding.

1. Mineral resources reported at a cut-off grade of 1.0% THM.

2. Mineral resources reported at a cut-off grade of 1.75% THM.

3. Mineral resources reported at a cut-off grade of 1.0% TVHM (THM \* VHM)

4. Mineral assemblage, via QEMScan Particle Analysis, is reported as a percentage of in situ THM content.

5. In-Situ TREO Grade is calculated by THM Grade (2.95%) multiplied by TREO Grade (2.43%).

6. Combined mineral resource at a cut-off grade of 1% THM for Area1 and Area 3 and 1% TVHM for Nowie, Area 2 and Area 4.

The Mineral Resource estimate was updated and disclosed in the ASX release published 9 April 2024

	Material	In-Situ TREO + Y <sub>2</sub> O <sub>3</sub> Grade <sup>(5)</sup>	In-Situ TREO + Y <sub>2</sub> O <sub>3</sub>
	(t)	(%)	(t)
Area 1, Area 2, Area 3, Area 4, Cannie, Nowie	892,000,000	0.07	650,000



# Company Ore Reserves

## 210.2Mt Ore Reserve

Area	Classification	Ore	In-situ THM	THM	THM Assemblage <sup>1</sup>					
					Zircon	Rutile	Leucoxene	Ilmenite	Monazite	Xenotime
		(Mt)	(Mt)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Area 1	Proved	24.5	1.3	5.4	29.9	10.8	9.0	24.7	4.3	0.8
Area 1	Probable	14.6	0.5	3.2	29.2	11.7	9.2	25.5	4.5	0.9
Area 3	Probable	159.6	5.6	3.5	20.3	9.4	8.1	25.8	3.4	0.6
Area 4	Probable	11.5	0.6	5.6	19.6	12.2	10.1	24.6	3.0	0.7
Total	Proved	24.5	1.3	5.4	29.9	10.8	9.0	24.7	4.3	0.8
	Probable	185.7	6.7	3.6	20.9	9.8	8.4	25.7	3.4	0.6
Grand Total		210.2	8.0	3.8	22.4	10.0	8.5	25.5	3.6	0.7

Area	Classification	Rare Earth Oxides <sup>1</sup>													
		CeO <sub>2</sub>	Dy <sub>2</sub> O <sub>3</sub>	Er <sub>2</sub> O <sub>3</sub>	Eu <sub>2</sub> O <sub>3</sub>	Gd <sub>2</sub> O <sub>3</sub>	La <sub>2</sub> O <sub>3</sub>	Nd <sub>2</sub> O <sub>3</sub>	Pr <sub>6</sub> O <sub>11</sub>	Sm <sub>2</sub> O <sub>3</sub>	Tb <sub>4</sub> O <sub>7</sub>	Tm <sub>2</sub> O <sub>3</sub>	Y <sub>2</sub> O <sub>3</sub>	Yb <sub>2</sub> O <sub>3</sub>	TREO
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Area 1	Proved	0.960	0.070	0.050	0.004	0.060	0.480	0.380	0.110	0.070	0.012	0.008	0.470	0.050	2.720
Area 1	Probable	0.971	0.067	0.047	0.004	0.060	0.468	0.400	0.108	0.072	0.011	0.007	0.458	0.050	2.721
Area 3	Probable	0.805	0.057	0.039	0.003	0.056	0.378	0.339	0.093	0.064	0.009	0.006	0.386	0.040	2.297
Area 4	Probable	0.655	0.049	0.035	0.002	0.046	0.310	0.277	0.073	0.050	0.008	0.006	0.335	0.037	1.884
Total	Proved	0.960	0.070	0.050	0.004	0.060	0.480	0.380	0.110	0.070	0.012	0.008	0.470	0.050	2.720
	Probable	0.802	0.057	0.039	0.003	0.055	0.378	0.338	0.092	0.064	0.009	0.006	0.386	0.041	2.287
Grand Total		0.828	0.059	0.041	0.003	0.056	0.395	0.345	0.095	0.065	0.010	0.006	0.400	0.042	2.359

Note: (1) Any discrepancies in totals are a function of rounding. THM Assemblage and Rare Earth Oxides are reported as a percentage of in-situ THM content. The Ore Reserve was updated and disclosed under the JORC Code (2012) in the ASX release published 29 September 2023.



# Goschen DFS Ore Reserve

98.8Mt Ore Reserve – Subset of global Company Ore Reserves

Area	Date	Classification	Ore	THM	Zircon	Rutile	Leucoxene	Ilmenite	Monazite	Xenotime
			(Mt)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Area 1	Mar-21	Proved	25.5	5.6	29.6	10.8	9.1	24.7	4.3	0.8
Area 1	Mar-21	Probable	7.6	2.2	27.6	12.7	10.5	25.9	4.3	0.9
Area 3	Feb-21	Probable	65.7	3.6	19.7	9.1	7.9	25.3	3.3	0.6
Total		Proved	25.5	5.6	29.6	10.8	9.1	24.7	4.3	0.8
		Probable	73.3	3.4	20.2	9.3	8.1	25.4	3.4	0.6
Grand Total			98.8	4.0	23.6	9.9	8.5	25.1	3.7	0.7

Area	Date	Classification	CeO <sub>2</sub>	Dy <sub>2</sub> O <sub>3</sub>	Er <sub>2</sub> O <sub>3</sub>	Eu <sub>2</sub> O <sub>3</sub>	Gd <sub>2</sub> O <sub>3</sub>	La <sub>2</sub> O <sub>3</sub>	Nd <sub>2</sub> O <sub>3</sub>	Pr <sub>6</sub> O <sub>11</sub>	Sm <sub>2</sub> O <sub>3</sub>	Tb <sub>4</sub> O <sub>7</sub>	Tm <sub>2</sub> O <sub>3</sub>	Y <sub>2</sub> O <sub>3</sub>	Yb <sub>2</sub> O <sub>3</sub>	TREO
			(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Area 1	Mar-21	Proved	0.960	0.070	0.050	0.004	0.060	0.480	0.380	0.110	0.070	0.012	0.008	0.470	0.050	2.720
Area 1	Mar-21	Probable	0.957	0.065	0.045	0.003	0.059	0.454	0.398	0.104	0.071	0.012	0.007	0.456	0.050	2.682
Area 3	Feb-21	Probable	0.795	0.056	0.038	0.003	0.055	0.373	0.335	0.091	0.063	0.009	0.006	0.383	0.039	2.271
Total			Proved	0.960	0.070	0.050	0.004	0.060	0.380	0.110	0.070	0.012	0.008	0.470	0.050	2.720
			Probable	0.806	0.056	0.039	0.003	0.055	0.339	0.092	0.064	0.009	0.006	0.388	0.040	2.298
Grand Total			0.862	0.061	0.043	0.003	0.057	0.415	0.354	0.099	0.066	0.010	0.007	0.417	0.044	2.451

Note: (1) Any discrepancies in totals are a function of rounding. THM Assemblage and Rare Earth Oxides are reported as a percentage of in-situ THM content. The Ore Reserve was disclosed under the JORC Code (2012) in the Company Prospectus 5 January 2023.





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