

# Browns Range Heavy Rare Earths Project

*RIU Explorers Conference*



**NORTHERN  
MINERALS**

**ASX  
NTU**

Presented by:

**Mark Tory**

CEO

18<sup>th</sup> February 2021

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## Compliance Statement

The information in this document that relates to the Mineral Resource Estimates of the Wolverine, Gambit, Gambit West, Area 5, Cyclops, Banshee deposits and Pilot Plant Stockpiles is extracted from the Company’s ASX Announcement dated 28 September 2018 entitled “Mineral Resource and Ore Reserve Update – Post Trial Mining Operations at June 30 2018” and is available to view on the Company’s website ([www.northernminerals.com.au](http://www.northernminerals.com.au)) and at [www.asx.com.au](http://www.asx.com.au), and was completed in accordance with the guidelines of the JORC Code (2012). The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the Mineral Resource Estimates in the original market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person’s findings are presented have not been materially modified from the original market announcement.

The information in this document that relates to the Mineral Resource Estimate for the Dazzler deposit is extracted from the Company’s ASX Announcement dated 7 May 2020 entitled “Over 50% increase in Dazzler high-grade mineral resource” and is available to view on the Company’s website ([www.northernminerals.com.au](http://www.northernminerals.com.au)) and at [www.asx.com.au](http://www.asx.com.au), and was completed in accordance with the guidelines of the JORC Code (2012). The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the Mineral Resource Estimates in the original market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person’s findings are presented have not been materially modified from the original market announcement.

The information in this document that relates to Ore Reserves is extracted from the Company’s ASX Announcement dated 28 September 2018 entitled “Mineral Resource and Ore Reserve Update – Post Trial Mining Operations at June 30 2018” and is available to view on the Company’s website ([www.northernminerals.com.au](http://www.northernminerals.com.au)) and at [www.asx.com.au](http://www.asx.com.au), and was completed in accordance with the guidelines of the JORC Code (2012). The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the Ore Reserves Estimates in the original market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person’s findings are presented have not been materially modified from the original market announcement.

The information in this document that relates to feed grades and ore sorting is extracted from the Company’s ASX announcement dated 11 October 2018 entitled “Ore sorting study shows potential to double the mill feed grade on Browns Range heavy rare earth stockpiles” and is available to view on the Company’s website ([www.northernminerals.com.au](http://www.northernminerals.com.au)) and at [www.asx.com.au](http://www.asx.com.au), and was completed in accordance with the guidelines of the JORC Code (2012). The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the results in the original market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person’s findings are presented have not been materially modified from the original market announcement.

The information in this document that relates to production targets and forecast financial information derived from a production target is extracted from the Company’s ASX Announcement dated 2 March 2015 entitled “DFS positions Browns Range Project as next dysprosium supplier” and is available to view on the Company’s website ([www.northernminerals.com.au](http://www.northernminerals.com.au)) and at [www.asx.com.au](http://www.asx.com.au). The Company confirms that all material assumptions underpinning the production targets and forecast financial information in the announcement released on 2 March 2015 continue to apply and have not materially changed.

TREO = Total Rare Earth Oxides – 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>

HREO = Heavy Rare Earth Oxides – Total of 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>



# Browns Range East Kimberley, WA



## Rare earth applications

- ◆ NdFeB Permanent magnets require dysprosium (Dy) and terbium (Tb)
- ◆ Electric drivetrains in passenger cars are forecast to account for the majority of increased demand through to 2030
- ◆ Dy and Tb also have a range of military applications
- ◆ Rare earths are also used in other applications such as technology, medical and robotics

terbium 65 <b>Tb</b> 158.93	dysprosium 66 <b>Dy</b> 162.50
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# Tier 1 resources jurisdiction



- Australia is one of the world's most proven, safe and reliable jurisdictions for mining and mineral processing
- Western Australia ranked first in Fraser Institute Investment Attractiveness Index ratings
- Northern Minerals is actively engaging with Critical Minerals Facilitation Office established in Canberra in January 2020
- Secure tenement legislation and environmental approvals framework benefits local operators
- Established trade, export and logistics network and supporting economy

# Our Aspiration

*Principal supplier of ethically produced rare earth separated products with a world class heavy rare earth element inventory*

## An eleven year \$272m journey

	DISCOVERY	EXPLORATION	EVALUATION AND APPROVALS			DFS	NEW PLAN	DEVELOPMENT		TESTWORK	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

### Our main focus for 2021:

- Complete feasibility study for full scale Beneficiation plant;
- Accelerated exploration aiming to expand the resource base;
- Ore sorting implemented;
- Continue testing the economic and technical viability of the pilot plant; and
- Continue to investigate options for further separation.



# Australian HREE production is ethical

- ◆ Browns Range produces HREE from hard rock xenotime ore at a grade of 600 – 800 ppm Dy
- ◆ Mining and processing methods in China, due to low grade ore, operate at just 20 – 40 ppm Dy
- ◆ 98% of world's heavy rare earths are currently produced by China
- ◆ Many operations are in situ leach operations, which are dirty and environmentally dangerous



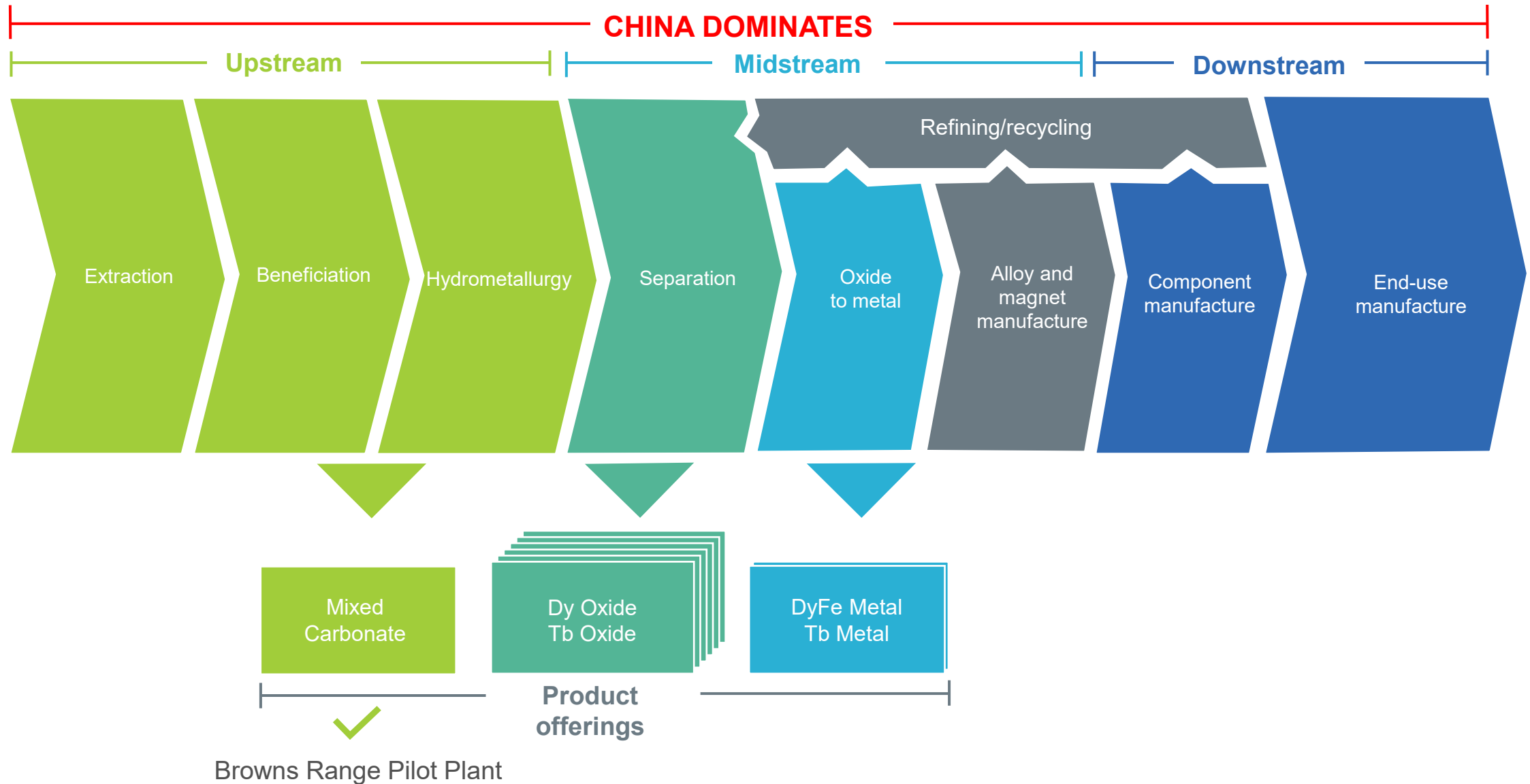
Southern China in situ leach mining operation



Browns Range Pilot Plant



# Rare earth magnet supply chain



# Non-Chinese rare earths supply chain now a critical priority

- ◆ The priority of securing a rare earths supply chain outside of China has escalated for both the United States and Australian governments
- ◆ Executive Orders (EO) from new US President Joe Biden enforce climate change measures including moving to zero emission vehicles
- ◆ An EO from former US President Donald Trump declared a critical minerals supply emergency on 30 September 2020
- ◆ The EO singled out the US's undue reliance on China for multiple critical minerals
- ◆ The US currently imports 80 per cent of its rare earth elements directly from China
- ◆ Importantly, the EO supports Policy to build resilient critical mineral supply chains in the US and with strong allies

LRE  
HRE

scandium 21	yttrium 39	lanthanum 57	cerium 58	praseodymium 59	neodymium 60	promethium 61	samarium 62	europium 63	gadolinium 64	terbium 65	dysprosium 66	holmium 67	erbium 68	thulium 69	ytterbium 70	lutetium 71
Sc 44.956	Y 88.906	La 138.91	Ce 140.12	Pr 140.91	Nd 144.24	Pm [145]	Sm 150.36	Eu 151.96	Gd 157.25	Tb 158.93	Dy 162.50	Ho 164.93	Er 167.26	Tm 168.93	Yb 173.05	Lu 174.97





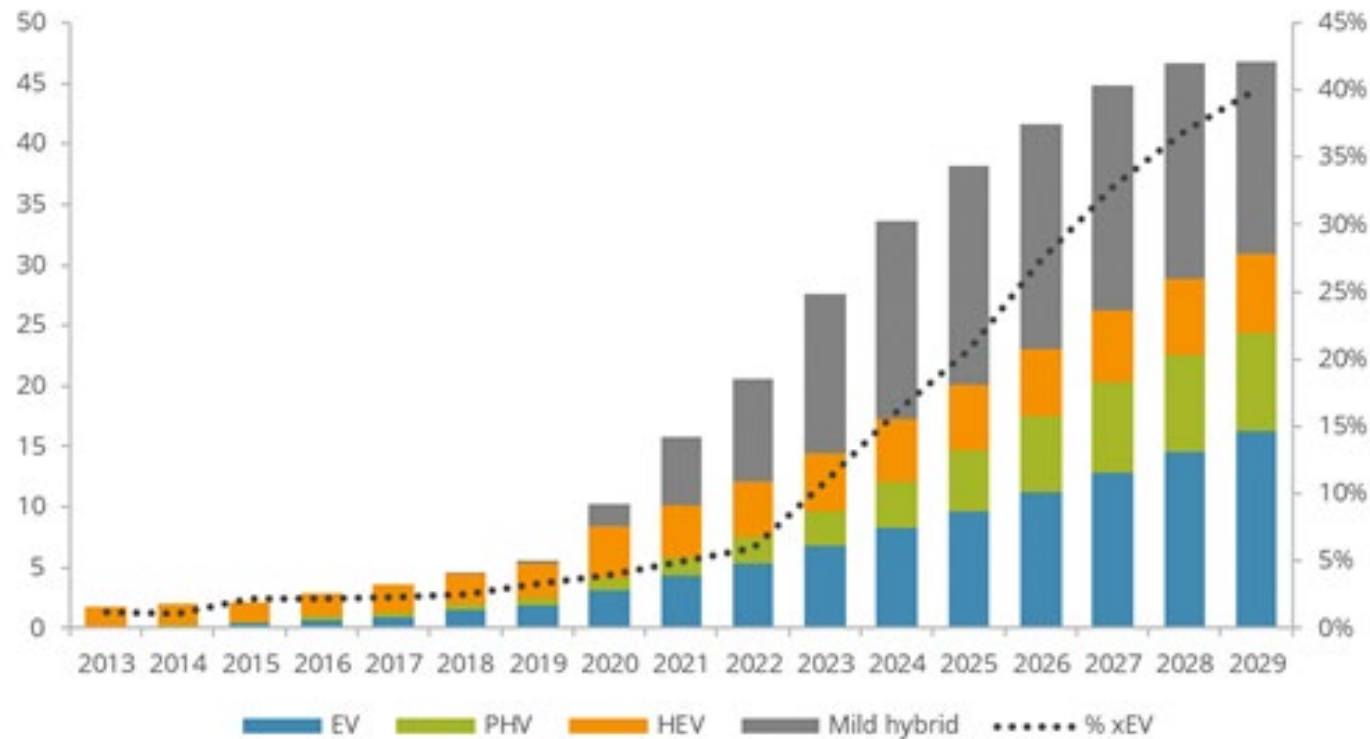
# Australian Government prioritising financial support

- ◆ The 2020/21 Australian Federal Budget announced a \$1.5 billion strategy to support Australian industry
- ◆ The Modern Manufacturing Initiative (MMI) prioritises critical minerals processing and resources technology
- ◆ The Manufacturing Integration Stream (MIS) will fund up to 50% of an eligible project's cost, with the first round to begin in the first half of 2021
- ◆ The Federal Government has also renewed its support for funding R&D tax offsets, which has underpinned NTU's significant capital investment on HREE manufacturing to date
- ◆ Access to indirect Government support via Export Finance Australia and Northern Australia Infrastructure Facility



# Demand for electric vehicles continues to grow

Electric vehicle sales by type, 2013 – 2029 (M units)



- Electric vehicle (EV) and renewables demand is increasing, with significant uplift expected over the next decade (UK recently announced no sales of petrol and diesel vehicles by 2030)
- EV sales and growth will be limited by access to raw and finished commodities
- Rare earths have been classified as critical minerals as there are limited supply options for HRE and China has a monopoly position
- Northern Minerals' Browns Range Project is an advanced heavy rare earth project that has the potential to fill some of the market gap and provide surety of supply

Source: Roskill Rare Earths Outlook 2020-2029



# Dysprosium pricing 2010 - 2021



- ◆ In 2010/11, China restricted rare earth exports as part of a dispute with Japan in the South China Sea. The Dy price spiked at over US\$2,000/kg
- ◆ Dy price currently up over 48% from start of November 2020



Source: Asian Metal



# Terbium pricing 2010 - 2021



Source: Asian Metal



# The Rare Metals War

The Dark Side of Clean Energy and Digital Technologies  
Guillaume Pitron

- ◆ French investigative journalist
- ◆ Documents issues with RE production in China
- ◆ Discusses how the gap is closing of internal China supply v demand



the dark side of clean energy and digital technologies

GUILLAUME PITRON


# Continuous improvement – ore sorting



- ◆ Construction has commenced on the selected ore sorter system
- ◆ Ore sorter system concentrates ore in the beneficiation circuit based on x-ray transmission
- ◆ Previous trials of ore sorting at Browns Range identified the potential to more than double the feed grade to the mill at bench test scale (as per ASX announcement 11<sup>th</sup> of October 2018)
- ◆ Approvals for installation of the ore sorter system has been received
- ◆ Commissioning of the ore sorter system is planned to occur in April 2021

# Commercial scale DFS for beneficiation plant

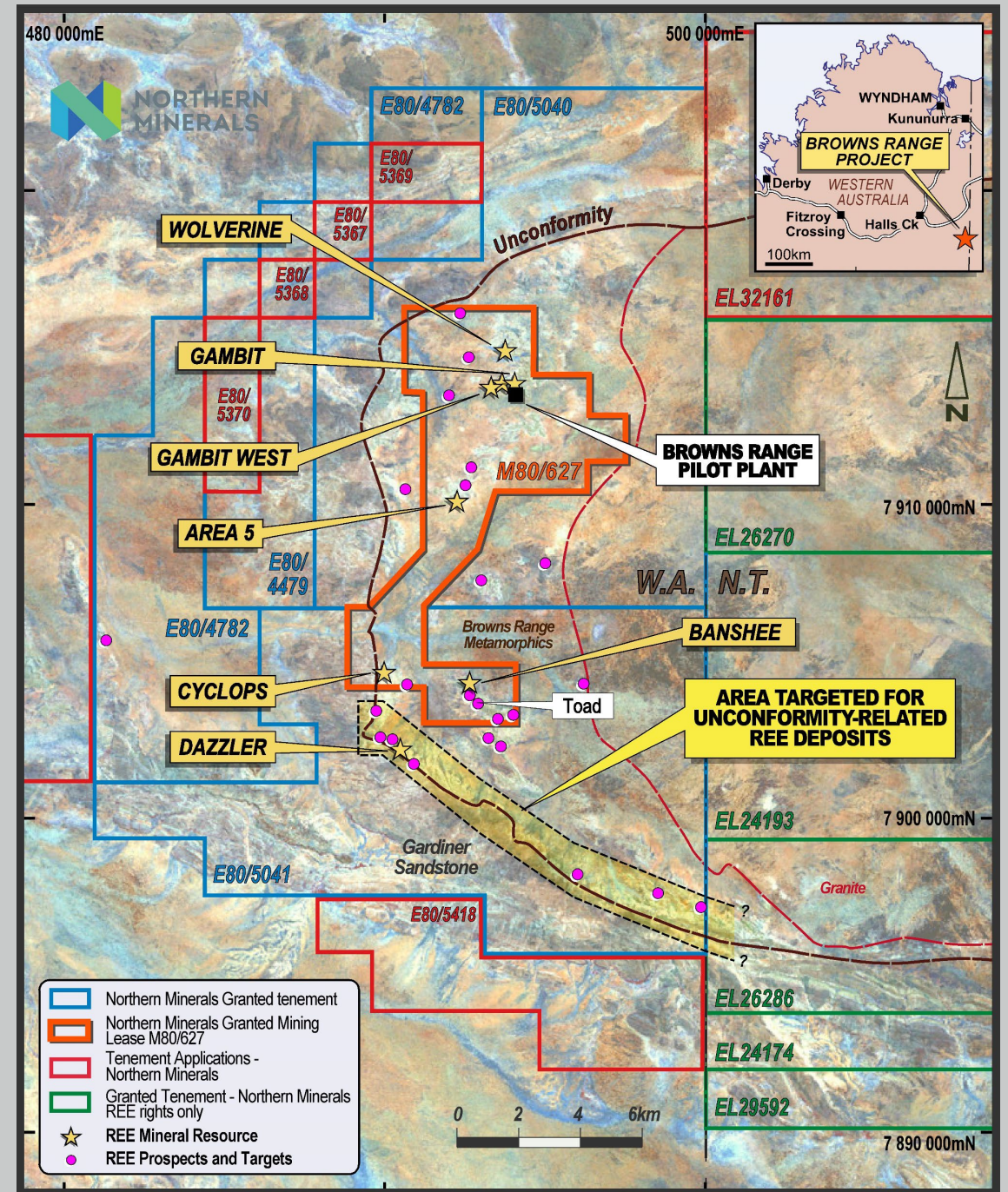
- ◆ Commercial market opportunity for beneficiated concentrate product subject to board approval of FS\*
- ◆ Lower risk approach in building full scale beneficiation plant first as stand-alone project
- ◆ Aiming to have cashflow in 2023 which is at least 2 years earlier compared to plant with hydrometallurgical processing and separation
- ◆ NTU considers it easier to finance for beneficiation plant first as standalone project
- ◆ Cashflow potentially available to NTU while completing feasibility study on full scale plant (hydrometallurgy and separation)



*\* the Company is working towards completing a feasibility study for a commercial-scale beneficiation plant at Browns Range over the coming months and the decision whether or not to develop the commercial-scale beneficiation plant will be made by the Board following completion of that study."*

# Exploration ramping-up to grow resource

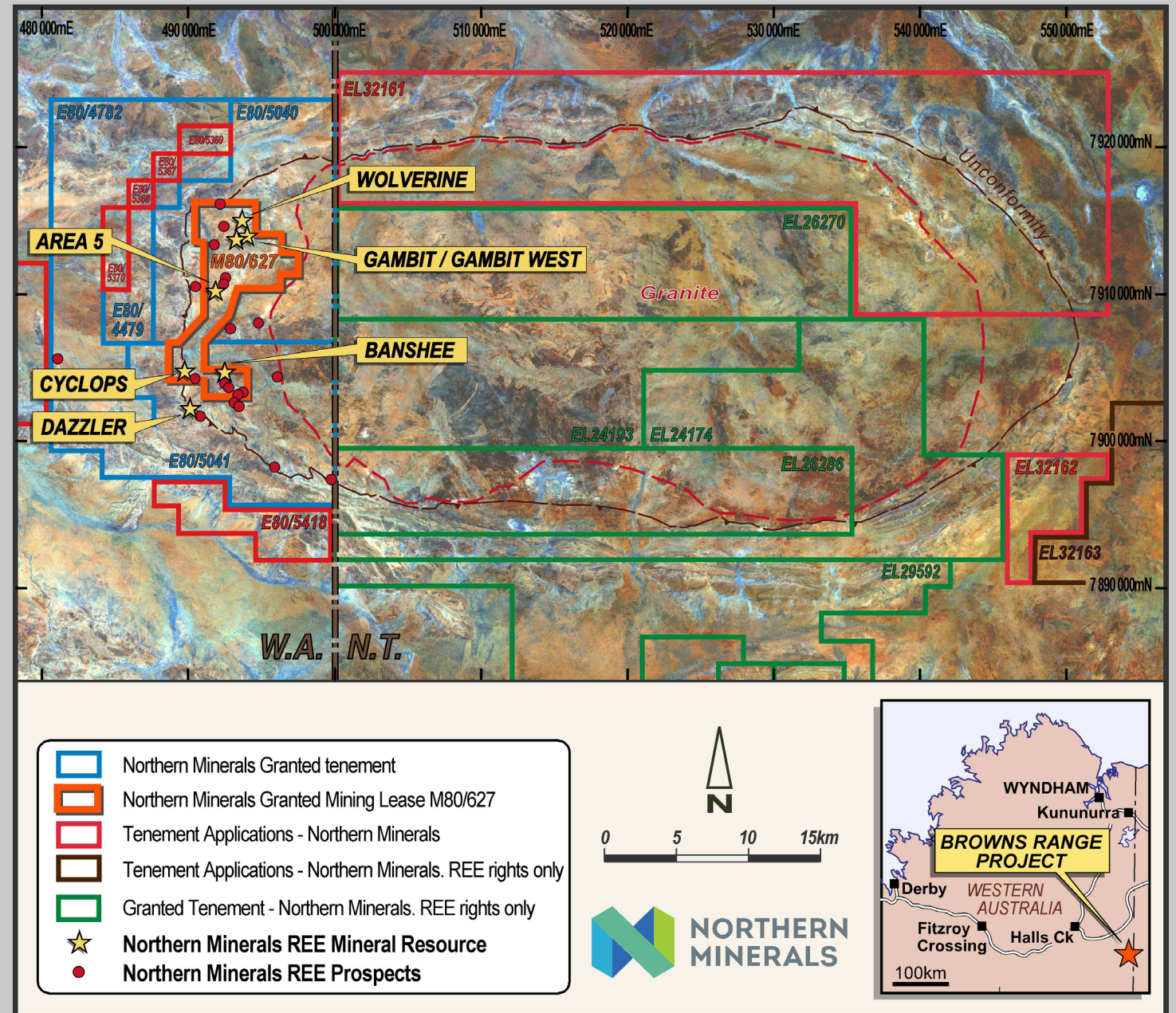
- Accelerated exploration across Browns Range commenced, with 8,500m of drilling completed in 2020
- A further 8,000m to be drilled on Browns Range tenements before the end of June 2021
- Encouraging results from first-pass drilling of greenfields targets in 2020
- Several new greenfields targets planned for drill-testing in 2021
- Exploration targeting high-grade near-surface unconformity-related REE deposits





# Exploration – “Own the Dome” strategy

- 100% owned tenure and/or 100% rare earth rights over the Browns Range Dome
- More than 2,300 square kilometres of tenure to evaluate
- Strategy to increase Mineral Resource and the life of mine potential at Browns Range to 20+ years
- Results, along with Pilot Plant testwork, will feed into a new feasibility study for a potential commercial scale plant



# Recent Capital Raise

- ◆ Secured commitments to raise A\$20 million before costs (oversubscribed)
- ◆ Placement to USA, Australian and European sophisticated and institutional investors through EAS Advisors in New York
- ◆ Funds to be used for work program in 2021 / 22 (including feasibility study for beneficiation plant)
- ◆ Fully funded to Board “go/no-go” decision on full scale beneficiation plant.
- ◆ If positive Board decision, intended that next major funding will be for build of full scale beneficiation plant

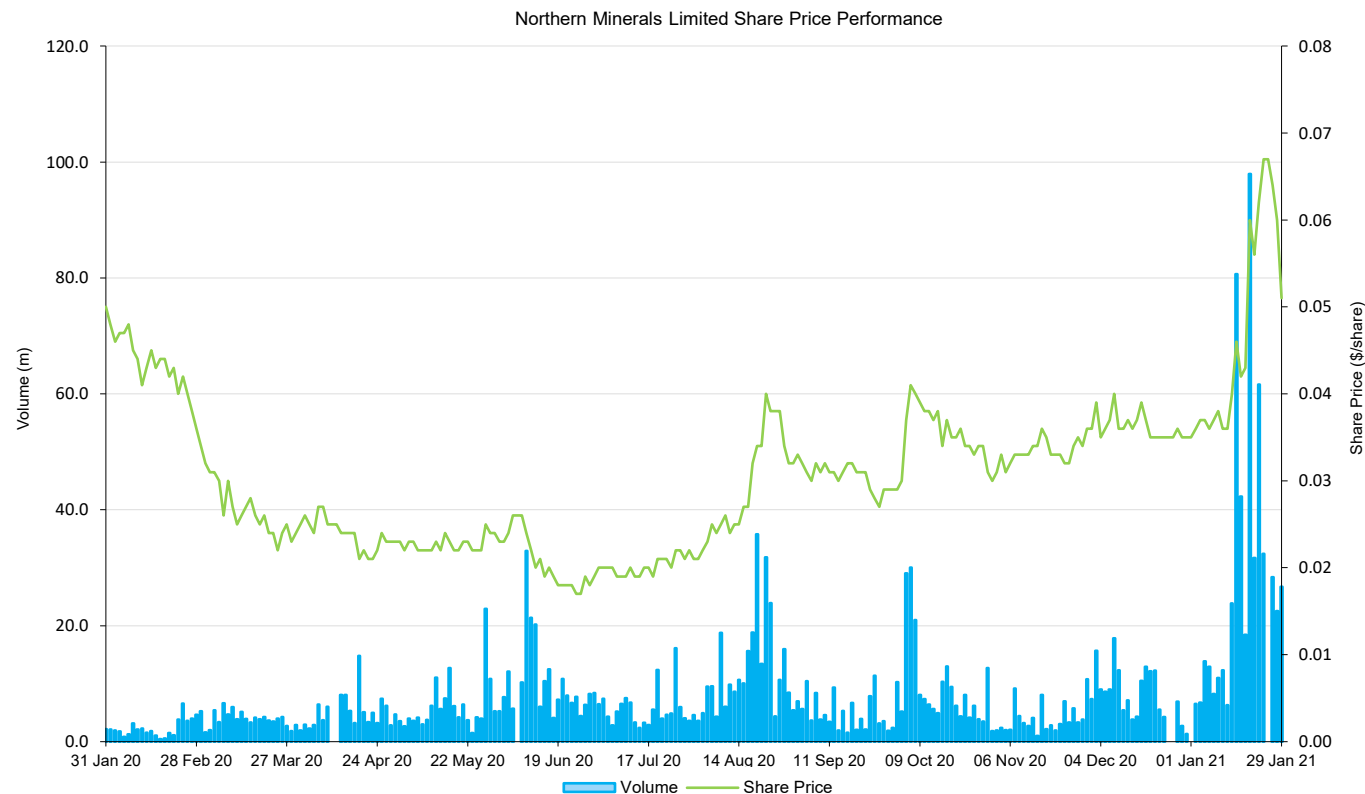


# Corporate Details



Major shareholders	31 January 2021
Citicorp Nominees	9.0%
Vastness Investment Group	8.4%
Mr Yongquan He	5.6%
Ms Yuzhen Ma	5.1%
ACiG	4.8%
Remaining Top 20	25.9%
Other	41.2%

Ordinary Shares as at 31 January 2021	4,437M
Options and Performance Rights as at 31 January 2021	47.8M
Market Capitalisation as at 31 January 2021	\$226.3M
Cash (as at 31 December 2020)	\$10.6M
Debt (as at 31 December 2020):	Nil
12 month low – high	\$0.017 - \$0.070
Average daily volume (12 month avg)	8.32M



# Why Northern Minerals has potential

- ◆ The only significant producer of HREE outside of China over the last 2 years
- ◆ The Company's IP on production of REC
- ◆ Commitment to realising exploration upside and building Resource inventory
- ◆ Fast-tracking feasibility for a full-scale, commercial mining and beneficiation operation
- ◆ Strong balance sheet, with no debt
- ◆ Browns Range is in leading tier one mining and mineral processing jurisdiction in WA
- ◆ United States and Australian governments acting on supply chain threat for HREEs



# Contact details

A photograph of Mark Tory, Chief Executive Officer of Northern Minerals, standing in front of a large industrial processing plant. He is wearing a white hard hat, a high-visibility yellow and blue work shirt, and dark blue work pants. The background shows a complex of metal structures, pipes, and a large cylindrical tank, all illuminated by site lights against a clear blue sky. A "ONE WAY" sign with an upward arrow is visible near the machinery.

**Mark Tory**

**Chief Executive Officer**

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# Appendices

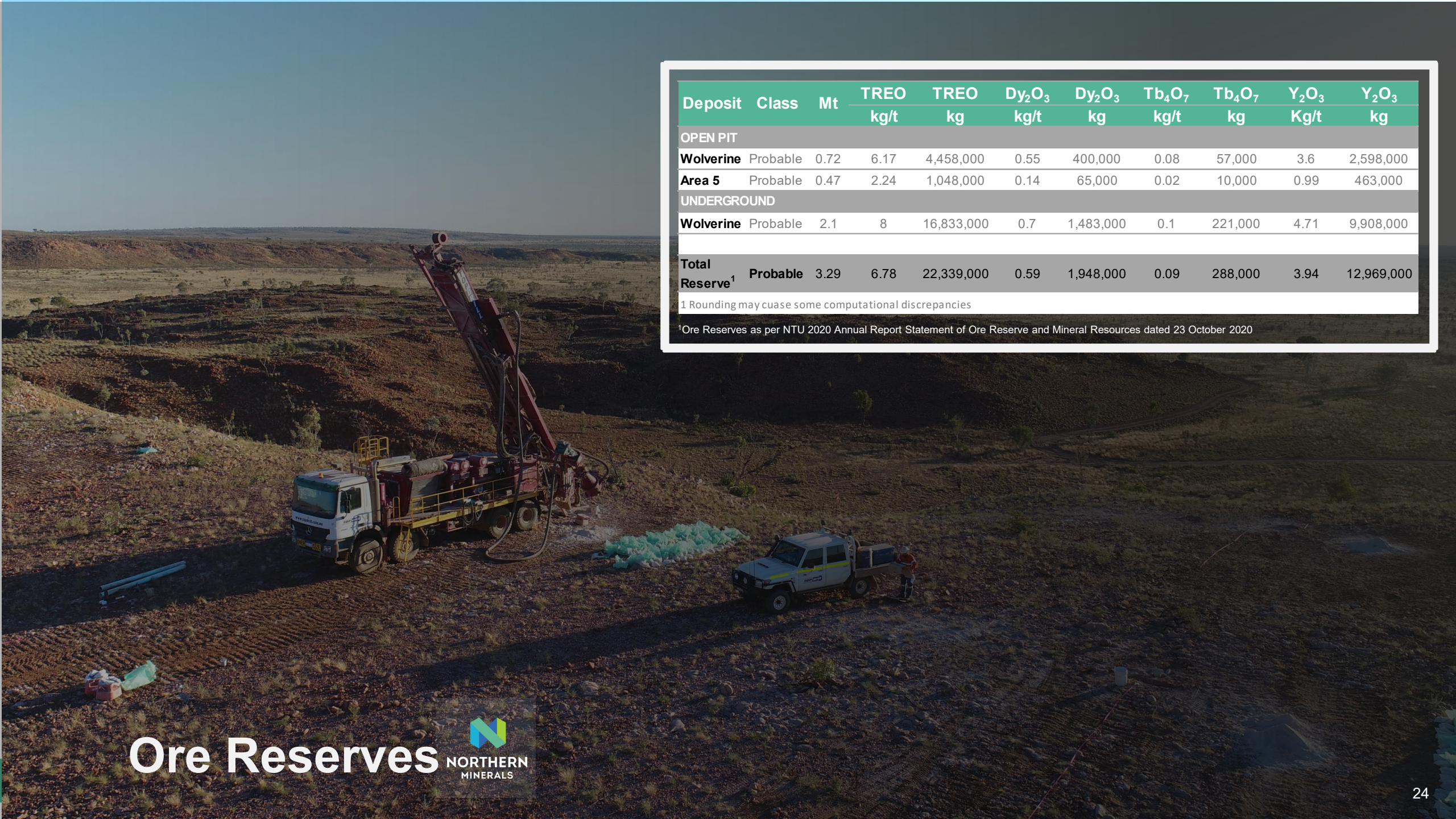




# Mineral Resource

Deposit	Classification	Mt	TREO %	Dy <sub>2</sub> O <sub>3</sub> kg/t	Y <sub>2</sub> O <sub>3</sub> kg/t	Tb <sub>4</sub> O <sub>7</sub> kg/t	HREO %	TREO kg
Wolverine	Indicated	2.88	0.84	0.74	4.89	0.11	89	24,195,000
	Inferred	1.97	0.89	0.76	5.15	0.11	88	17,588,000
	<b>Total<sup>1</sup></b>	4.85	0.86	0.75	4.99	0.11	89	41,786,000
Gambit West	Indicated	0.12	1.8	1.62	10.98	0.22	94	2,107,000
	Inferred	0.13	0.51	0.4	2.67	0.05	81	674,000
	<b>Total<sup>1</sup></b>	0.25	1.11	0.97	6.56	0.13	91	2,781,000
Pilot Plant Stockpiles	Indicated	0.18	0.95	0.83	5.53	0.12	89	1,661,000
	Inferred	0.03	0.26	0.2	1.35	0.03	79	89,000
	<b>Total<sup>1</sup></b>	0.21	0.84	0.73	4.84	0.1	88	1,750,000
Gambit	Indicated							
	Inferred	0.21	0.89	0.83	5.62	0.11	96	1,878,000
	<b>Total<sup>1</sup></b>	0.21	0.89	0.83	5.62	0.11	96	1,878,000
Area 5	Indicated	1.38	0.29	0.18	1.27	0.03	69	3,953,000
	Inferred	0.14	0.27	0.17	1.17	0.03	70	394,000
	<b>Total<sup>1</sup></b>	1.52	0.29	0.18	1.26	0.03	69	4,347,000
Cyclops	Indicated							
	Inferred	0.33	0.27	0.18	1.24	0.03	70	891,000
	<b>Total<sup>1</sup></b>	0.33	0.27	0.18	1.24	0.03	70	891,000
Banshee	Indicated							
	Inferred	1.66	0.21	0.16	1.17	0.02	87	3,484,000
	<b>Total<sup>1</sup></b>	1.66	0.21	0.16	1.17	0.02	87	3,484,000
Dazzler	Indicated							
	Inferred	0.21	2.33	2.17	13.93	0.29	95	5,000,000
	<b>Total<sup>1</sup></b>	0.21	2.33	2.17	13.93	0.29	95	5,000,000
<b>Total<sup>1</sup></b>	Indicated	4.56	0.7	0.6	3.98	0.09	87	31,916,000
	Inferred	4.68	0.64	0.54	3.67	0.08	88	29,998,000
	<b>Total<sup>1</sup></b>	9.24	0.67	0.57	3.81	0.08	87	61,917,000

<sup>1</sup> – Rounding may cause some computational discrepancies (TREO (metal) tonnes estimated from Mt x TREO%).  
Mineral Resources as per NTU 2020 Annual Report Statement of Ore Reserve and Mineral Resources dated 23 October 2020



Deposit	Class	Mt	TREO kg/t	TREO kg	Dy <sub>2</sub> O <sub>3</sub> kg/t	Dy <sub>2</sub> O <sub>3</sub> kg	Tb <sub>4</sub> O <sub>7</sub> kg/t	Tb <sub>4</sub> O <sub>7</sub> kg	Y <sub>2</sub> O <sub>3</sub> Kg/t	Y <sub>2</sub> O <sub>3</sub> kg
<b>OPEN PIT</b>										
<b>Wolverine</b>	Probable	0.72	6.17	4,458,000	0.55	400,000	0.08	57,000	3.6	2,598,000
<b>Area 5</b>	Probable	0.47	2.24	1,048,000	0.14	65,000	0.02	10,000	0.99	463,000
<b>UNDERGROUND</b>										
<b>Wolverine</b>	Probable	2.1	8	16,833,000	0.7	1,483,000	0.1	221,000	4.71	9,908,000
<b>Total Reserve<sup>1</sup></b>	<b>Probable</b>	<b>3.29</b>	<b>6.78</b>	<b>22,339,000</b>	<b>0.59</b>	<b>1,948,000</b>	<b>0.09</b>	<b>288,000</b>	<b>3.94</b>	<b>12,969,000</b>
<sup>1</sup> Rounding may cause some computational discrepancies <sup>1</sup> Ore Reserves as per NTU 2020 Annual Report Statement of Ore Reserve and Mineral Resources dated 23 October 2020										



# Browns Range Pilot Plant flowsheet

