

ASX Announcement

## Presentation – 121 Mining Investment London

20 November 2019

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**Arafura Resources Limited (ASX: ARU) (Arafura or the Company)** is pleased to attach a copy of the presentation for the 121 Mining Investment Conference in London.

121 Mining Investment London is held on 20 – 21 November 2019 and brings together institutional investors, fund managers, analysts and resource company management teams.

- ENDS -

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# Arafura Resources Limited

(ASX:ARU)

*Emerging as Australia's Next NdPr Producer*

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## ***Mineral Resources and Ore Reserves***

The information in this presentation that relates to Mineral Resources was released in an ASX announcement dated 7 June 2017 (Detailed Resource Assessment Completed) and was completed in accordance with the guidelines of the JORC Code (2012). The information in this presentation that relates to Ore Reserves was released in an ASX announcement dated 7 February 2019 (Nolans Project Definitive Feasibility Study) and was completed in accordance with the guidelines of the JORC Code (2012). Arafura Resources confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in the original market announcements continue to apply and have not materially changed. Arafura Resources confirms that the form and context in which the Competent Person's findings are represented have not been materially modified from the original market announcement.

## ***Production Targets and Financial Information***

Information in relation to production targets and financial information included in this presentation is extracted from an ASX announcement dated 7 February 2019 (Nolans Project Definitive Feasibility Study). Arafura Resources confirms that all material assumptions underpinning the production target and financial information set out in the announcement released on 7 February 2019 continue to apply and have not materially changed.

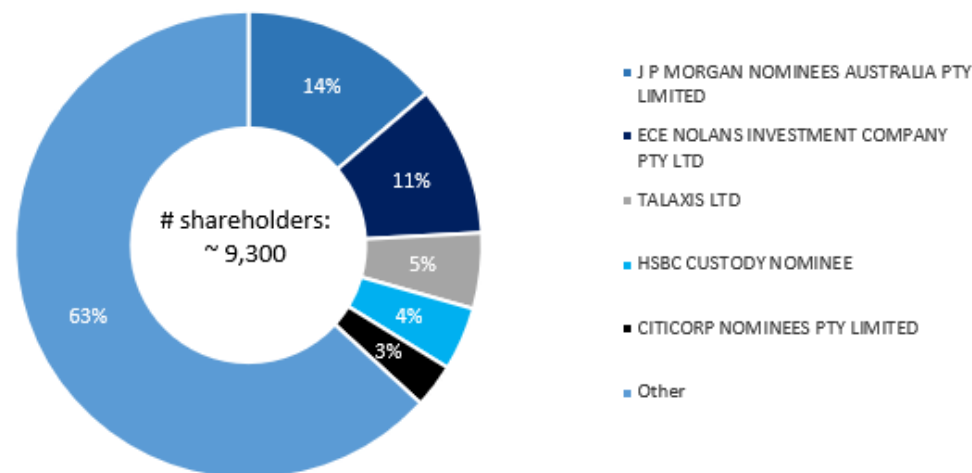
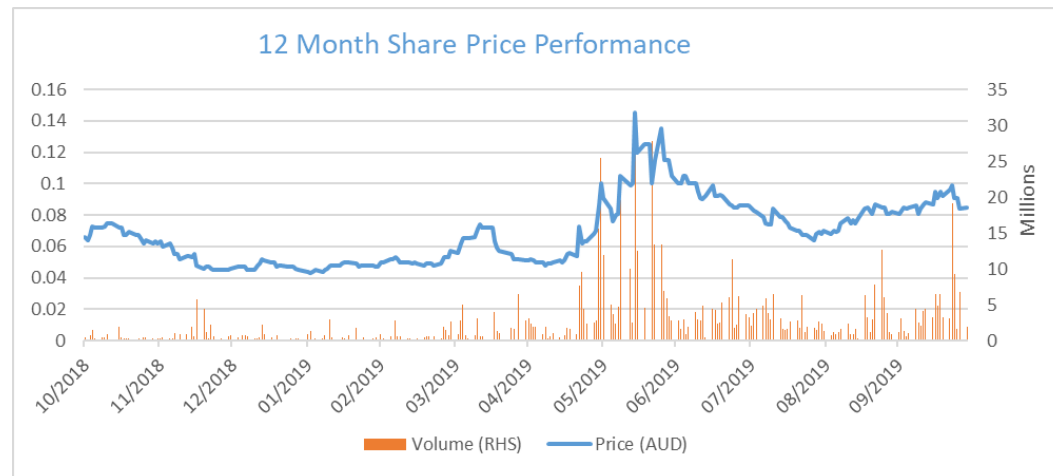
# Arafura Corporate Snapshot



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Capital Structure	
ASX Code	ARU
ASX Share Price (30 Sept)	\$0.086
Shares on Issue	1,055m
Market Capitalisation (30 Sept)	\$90.7m
12 Month Liquidity	\$58.5m
6 Month Liquidity	\$52.5m
Cash (30 Sept*)	\$26.4m
Debt	Nil
Enterprise Value (30 Sept*)	\$64.3m

- Nolans world class NdPr project – DFS completed February 2019
- NdPr is the key input for high performance NdFeB permanent magnets
- NdPr is a critical input for the manufacture of energy efficient electric motors
- NdPr central to many clean energy applications including EVs and wind turbines



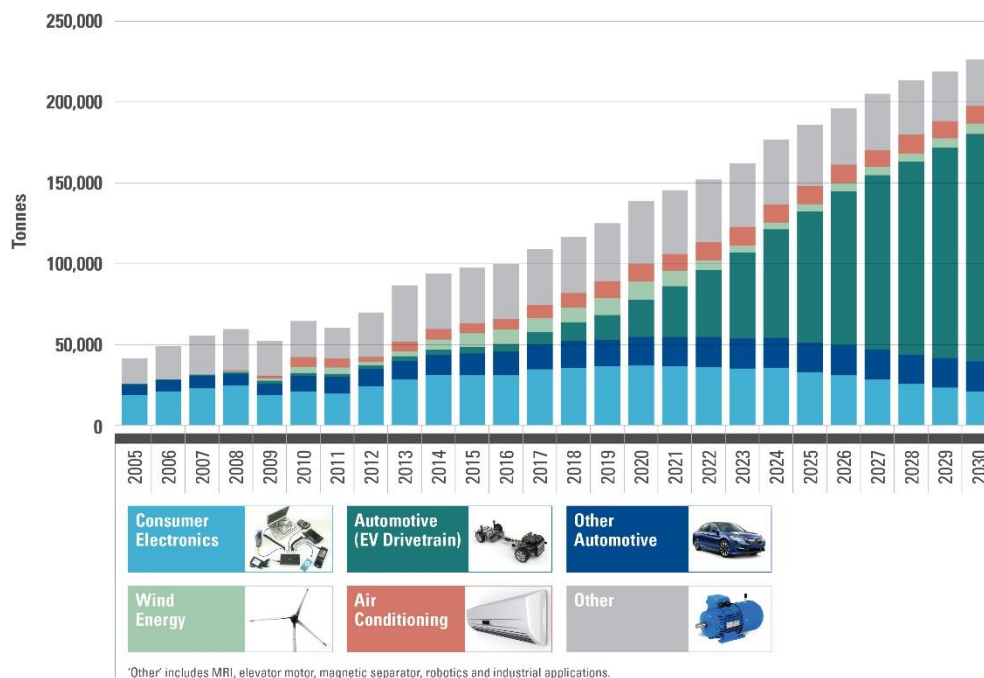
\* Data based on 30 September 2019 Quarterly report plus R&D rebate received 9 Oct 2019

# 4 NdPr Market Opportunity

# NdPr Market Opportunity

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**NdFeB Magnet Demand by Application**

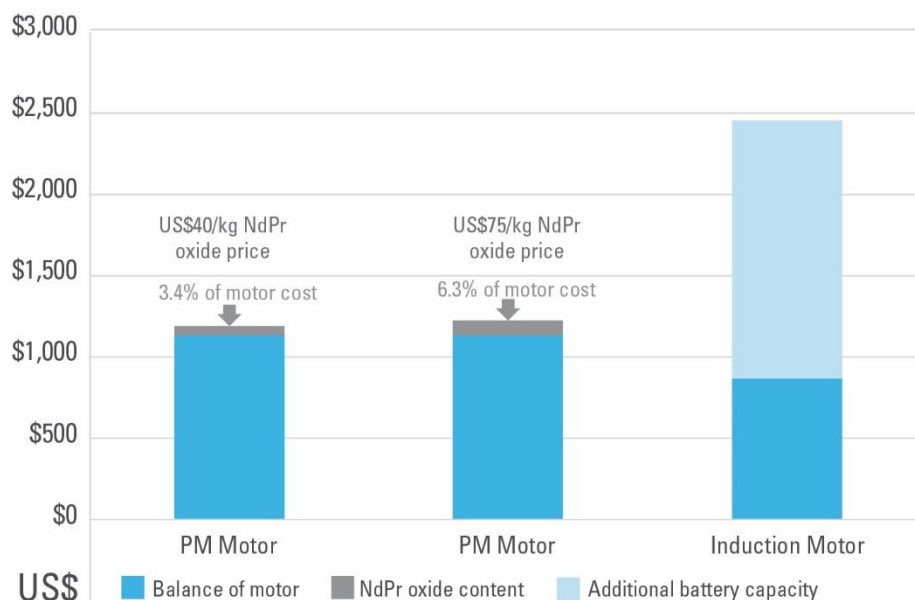


- Underlying demand for NdFeB magnets across all applications is forecast to grow by 6% p.a. over the period to 2030
- NdFeB demand growth for EV applications is more dramatic and forecast to grow by 24% p.a.
- Supply-demand balance achieved through demand destruction in lower quality applications and technology innovations that achieve better use of NdPr in magnet manufacturing
- Demand in applications for consumer electronics and wind turbines will reduce during the forecast period. For some applications substitution will be traded off against reduced performance and cost.
- EV applications require high quality and efficient motors using NdFeB magnets
- New supply will not come on stream fast enough to meet demand from all applications – NdFeB magnets and NdPr oxide will move to the best value in use

Source: Roskill Consulting (November 2018) – Rare Earths Market Analysis

# NdPr Magnet Power Efficiency & Deprival Value

## Modelled effect of increase in NdPr price, Permanent Magnet (PM) vs Induction Motor and incremental Li-ion Battery Pack



- Chevrolet Bolt: 150 kW permanent magnet (PM) motor with 60 kWh lithium-ion battery pack.<sup>1</sup>
- PM motor cost based on US\$8 per kW.<sup>2</sup>
- Estimate of 1 kilogram of NdPr metal per PM motor.<sup>2</sup>
- Induction motor cost calculated as 76% of PM motor.<sup>3</sup>
- Efficiency of induction motor 15% less than PM motor.<sup>4</sup> To compensate, an extra 6 kWh of battery capacity has been allowed for.
- Lithium-ion battery pack costs of US\$176 per kWh applied.<sup>5</sup>

<sup>1</sup> [www.chevrolet.com](http://www.chevrolet.com)

<sup>2</sup> UBS, "UBS Evidence Lab Electric Car Teardown – Disruption Ahead?", [www.ubs.com/investmentresearch](http://www.ubs.com/investmentresearch), May 2017.

<sup>3</sup> Parker Hannifin, "Comparing AC Induction with Permanent Magnet motors in hybrid vehicles and the impact on the value proposition", 2013.

<sup>4</sup> Adamas Intelligence, "Spotlight on Dysprosium", [www.adamasintel.com/spotlight-on-dysprosium/](http://www.adamasintel.com/spotlight-on-dysprosium/), April 2018.

<sup>5</sup> Bloomberg New Energy Finance, "A Behind the Scenes Take on Lithium-ion Battery Prices", March 2019.

<sup>6</sup> Average NdPr oxide EXW China price for April 2019. [www.asianmetal.com](http://www.asianmetal.com)

# Rare Earths are now in the Mainstream Press

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sky news .COM.AU



Australia must 'help the US meet its need for critical minerals'

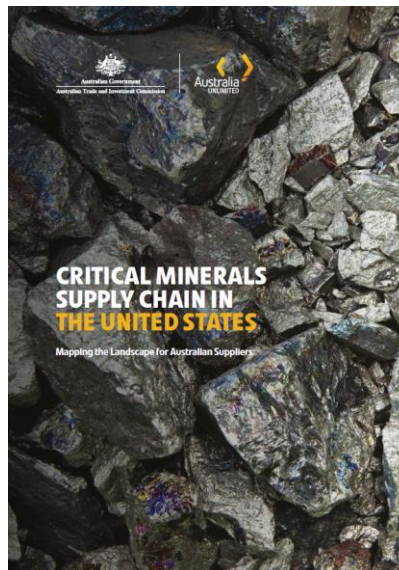
## FINANCIAL REVIEW

Australia points to holes in US rare earth supply chain

Why taxpayers should fund Aussie rare earth miners

## THE AUSTRALIAN

Australia to finalise joint strategy with US on rare earths mining



## Forbes

China And The U.S. Fight Over Australian Rare Earths



## REUTERS

U.S., Australia to unveil plan Friday to improve rare earth mineral supply

## 2GB 873AM

US looks to Australia for rare earths

## The Sydney Morning Herald

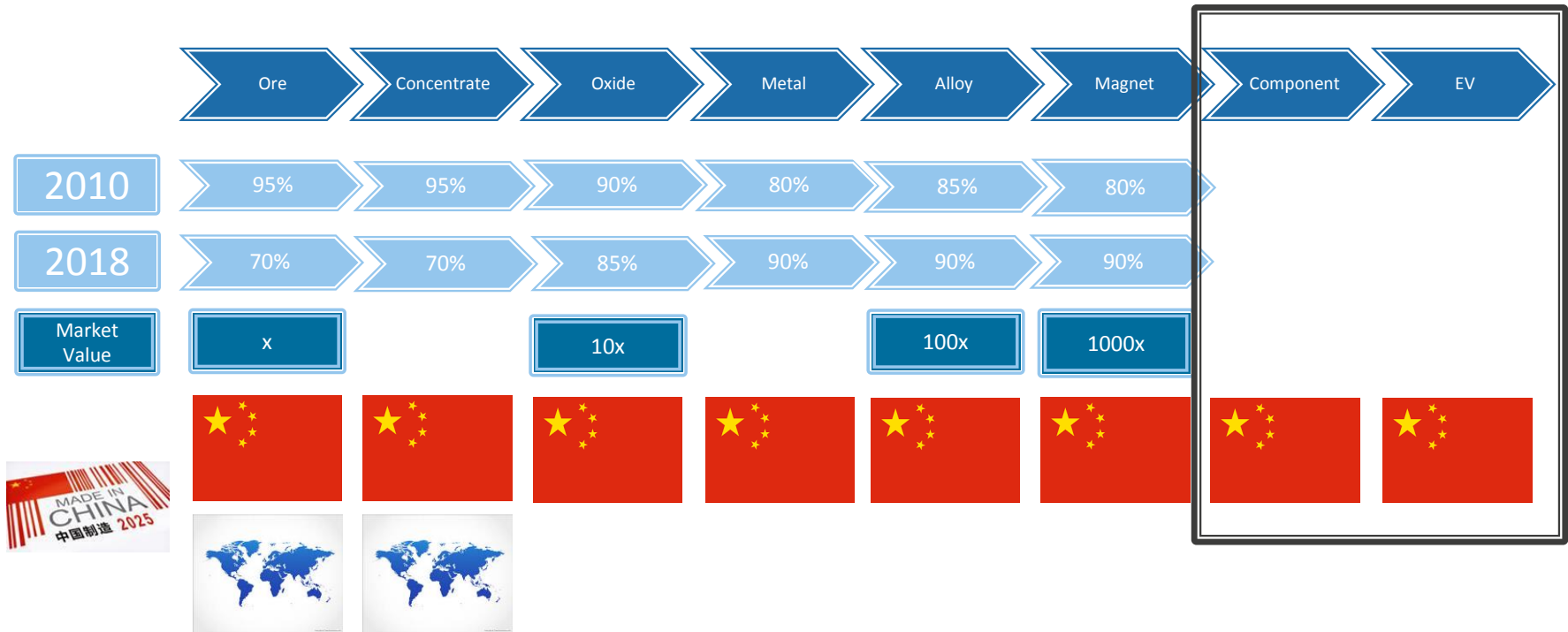
Morrison and Trump open new front in China trade war with rare earth 'action plan'



RARE EARTHS: IS THERE A CASE FOR GOVERNMENT INTERVENTION?

# China's Evolving Integrated NdPr Supply Chain – Enables 2025 EV Strategy

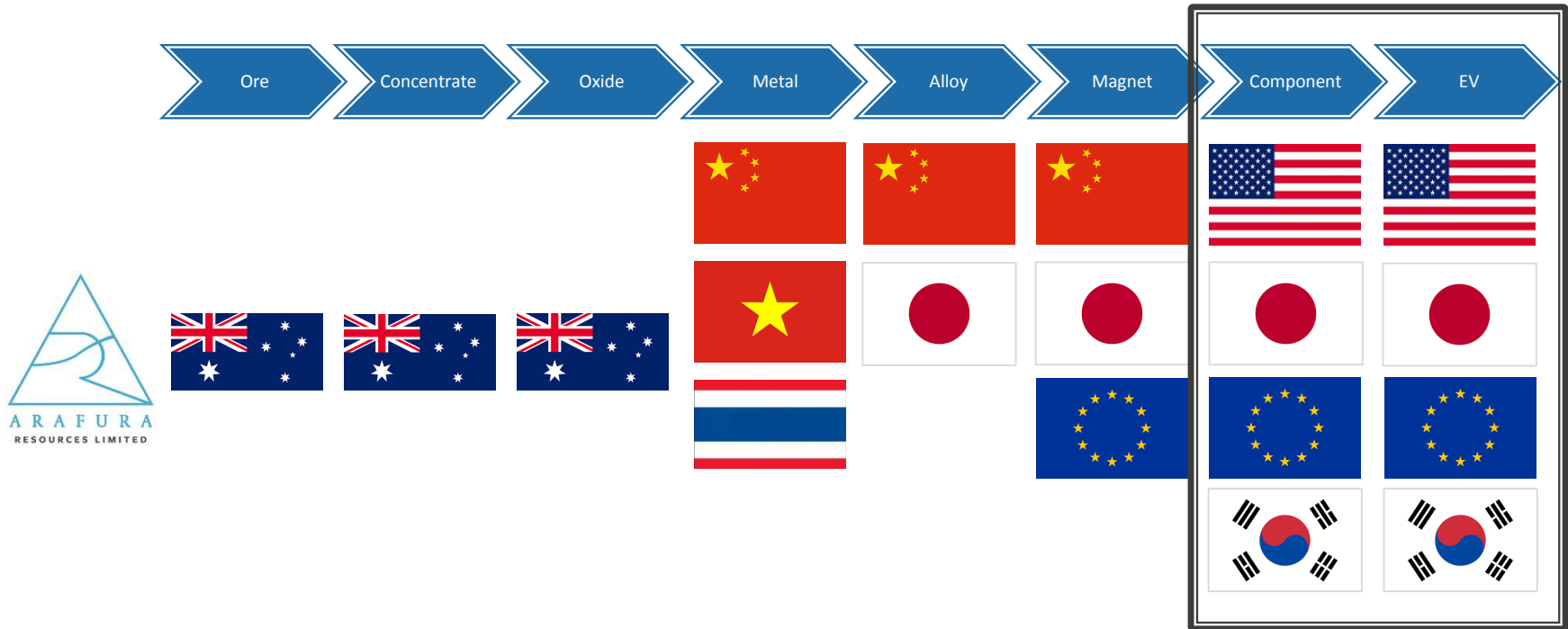
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- China is the only country with a fully integrated *Mine to Motor* supply chain
- Capital deployed down the value chain focused on enabling China's *Made In China 2025* EV strategy
- Access to capital and increased environmental constraints means ore, concentrate and oxide production from China will be less reactive to world demand
- More recently China has increased its reliance on concentrate and oxide from non- China sources

Source: Adamas Intelligence

# Rest of World Alternative Supply Chain



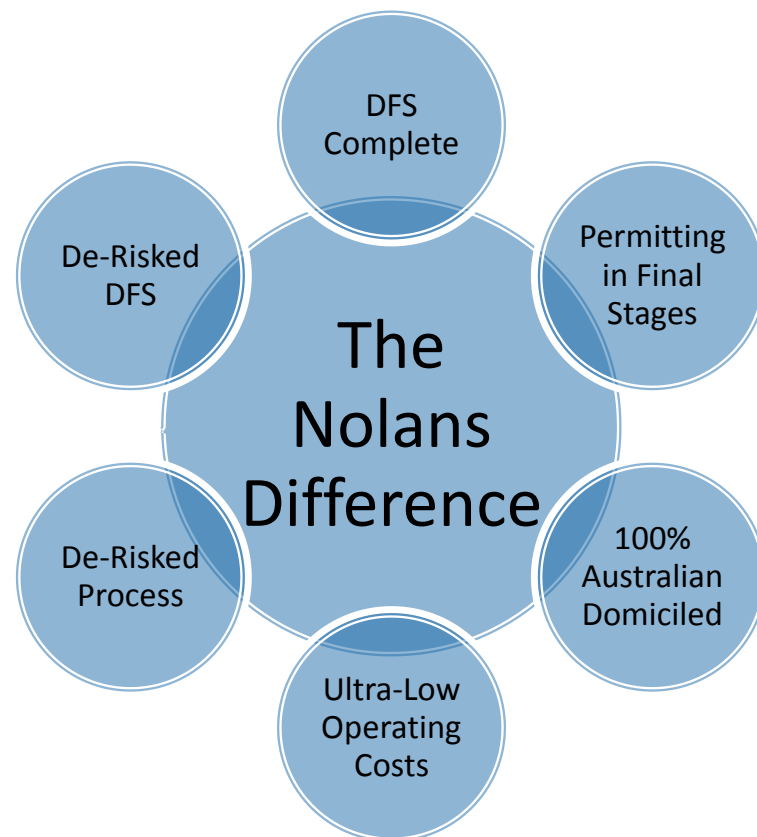
- European auto industry employs 13.8 million people which equates to 6.1% of the EU workforce and 11.4% of all manufacturing jobs (*"Electric cars sparks jobs fears in Germany's auto heartland"* – Wall Street Journal, August 2019)
- Diversification of NdPr supply source may provide better traceability, supply certainty and more transparent pricing
- Government recognition of the strategic significance of NdPr can enable multilateral *Mine to Motor* supply chain solutions

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# Nolans Project

# Definitive Feasibility Study (DFS) Completed

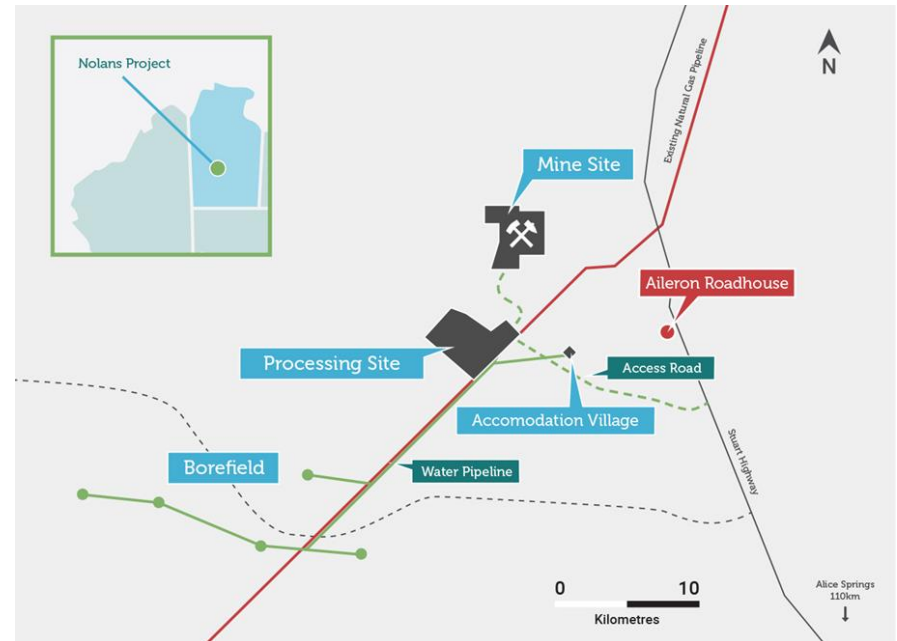
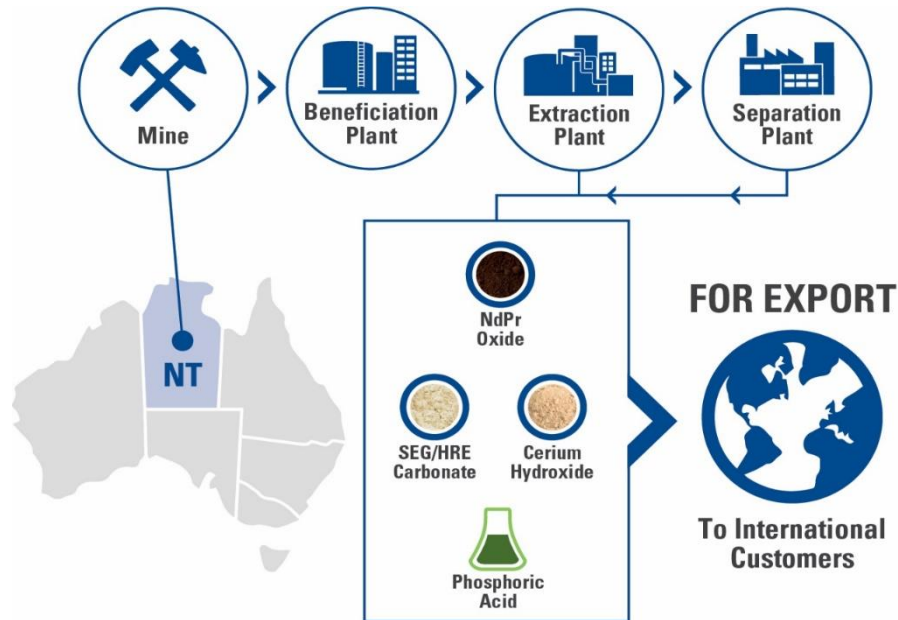
- DFS completed February 2019 confirming Nolans as a world class NdPr project
- CAPEX US\$726m, low OPEX producer at US\$25.94/kg NdPr
- Long-life asset – 23-year mine life based on Ore Reserves only with potential to extend production
- Well positioned to feed forecast NdPr supply shortfall
- Target project commissioning in 2022
- Globally strategic – 100% Australian-domiciled operation in the NT with environmental approval



*Refer ASX announcement 7 February 2019: Nolans Project Definitive Feasibility Study*

# 100% Australian Domiciled in the NT

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- Separation plant re-located to site during the year
- DFS includes fully-costed permanent disposal and rehabilitation of tailings and process residues at site
- Environmental approvals secured
- Able to provide customers with product traceability and waste management certainty

# Licence to Operate – Sustainable Supply

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Extensive community and stakeholder consultation

Waste management plan tailings and residue facility

Assessing impact from mining, extraction and transport corridor

Surface water and groundwater management plans

Biodiversity studies on existing flora and fauna

Framework for decommissioning closure and rehabilitation

ntepa Northern Territory  
Environment Protection Authority

## ASSESSMENT REPORT 84

NOLANS PROJECT  
ARAFURA RESOURCES LTD

December 2017

Australian Government  
Department of the Environment and Energy

### Approval

Nolans Rare Earth Project, 135 km North-West of Alice Springs, Northern Territory (EPBC 2015/7436)

This decision is made under sections 130(1) and 133 of the Environment Protection and Biodiversity Conservation Act 1999.

### Proposed action

person to whom the approval is granted Arafura Resources Limited

proponent's ACN 080 933 455

proposed action To construct and operate an open pit rare earths mine, intermediate processing facility using a phosphoric acid pre-leach process and associated support infrastructure, approximately 135 km north-west of Alice Springs, Northern Territory [See EPBC Act referral 2015/7436 and variation received 16 August 2016]

### Approval

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approved
Nuclear actions (sections 21 & 22A)	Approved

### conditions of approval

This approval is subject to the conditions specified below

### expiry date of approval

This approval has effect until 31 December 2069

### Decision-maker

name and position Gregory Manning  
Assistant Secretary  
Assessments (WA, SA, NT) and Post Approvals Branch

signature

date of decision 11 May 2018

GPO Box 787 Canberra ACT 2601 • Telephone 02 6274 1111 • www.environment.gov.au  
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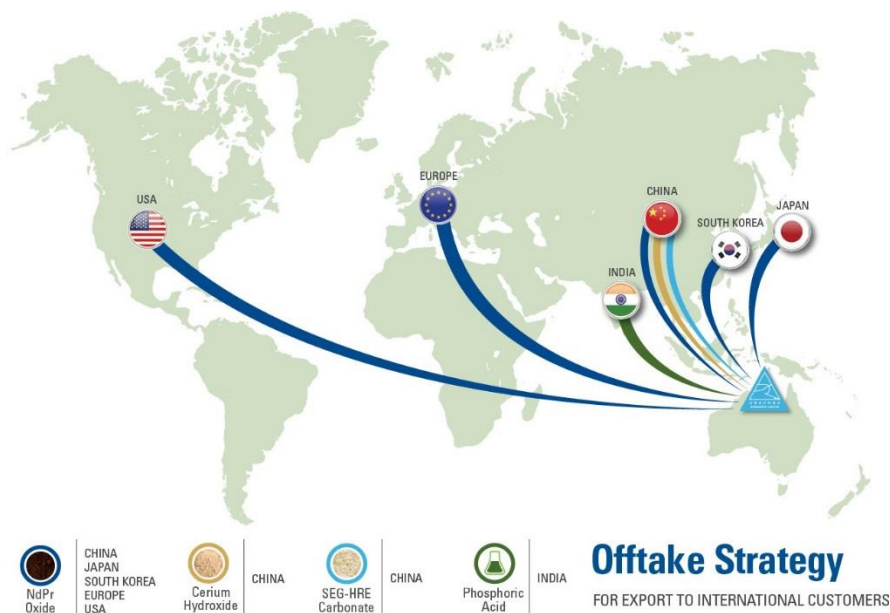
- Nolans is the only permitted site in Australia for rare earths mining, extraction and separation, including radioactive and other waste management from all processes
- Arafura can provide customers assurance for reliable and sustainable supply sourced outside China

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# Project Implementation

# Product Offtake

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- Customer engagement targeted at NdPr users not aligned with *Made In China 2025* strategy
  - Japan – NdFeB magnet manufacturers
  - Europe & Korea – automotive OEMs and wind turbine makers
  - China – NdFeB magnet manufacturers with significant export markets

Customer / Target Region		Amount (tonnes p.a.)	Offtake Status	Proportion of Revenue
NdPr Oxide – targeting contracts with NdFeB magnet companies &/or end users				
JingCi Material Science		900	MoU	96%
Baotou Tianhe Magnetics		900	MoU	
Japan		2,557	In progress	
South Korea				
Europe				
USA				
SEG-HRE Carbonate – targeting contracts with rare earth processors				
China		606 (TREO equivalent)	In progress	1%
Japan				
Cerium Hydroxide – targeting contracts with rare earth processors				
Baotou Xinyuan Rare Earth Hi-tech		8,383 (TREO equivalent)	MoU	3%

*Proportion of revenue for rare earth products only*

- U.S. emerging as an offtake opportunity
- India – vertically integrated fertilizer producers

# Project Funding Strategy

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- Arafura looking to secure US\$726m to meet CAPEX requirements for the Nolans Project
- Potential sources of funding include equity, debt, JV and/or project selldown with a strategic investor
- DFS completion and environmental approval are critical enablers for engagement with funding partners
- Currently in due diligence by Australian Government's Northern Australia Infrastructure Facility (NAIF)
- Recently completed A\$23.2m raising to accelerate Project timeline and get "shovel ready"

## Offtake & Equipment Procurement

- Offtake long term strategic supply
- Procurement for high value specialist capital equipment

## Export Credit Agencies

- Government-backed direct loans and guarantees
- Leveraged to strategic link with NdFeB magnet supply and capital equipment procurement
- NAIF mandate – encourage investment and Indigenous engagement in Northern Australia

## Commercial Banks

- Long-life project, high margin and low cost producer
- Offtake and Export Credit Agency(s) (ECA) – reduce market exposure and credit risk
- Improved bankability for conventional lenders

## Equity

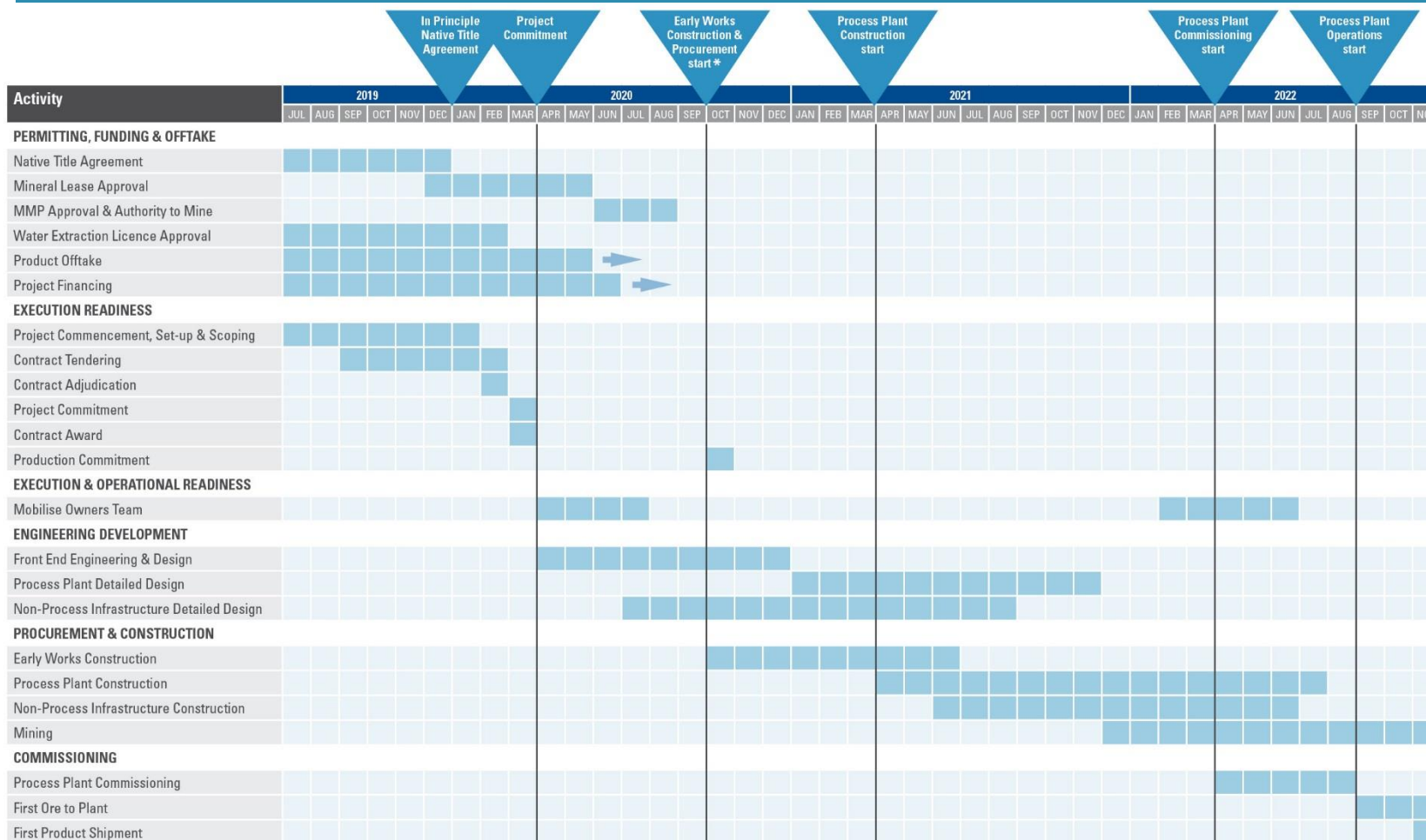
- ECA and bank involvement "halo-effect" – reduced funding risk and less equity dilution
- Market and technical validation
- JV / Project selldown opportunities

In addition to funding and offtake activities:

- **Drilling and metallurgical work in progress**
  - Targeted exploration and metallurgical program aims to potentially increase current mine life of 23 years
  - Opportunity to potentially reduce very low estimated OPEX of US\$25.94/kg NdPr (lowest amongst peers) even further
- **Negotiations with Central Land Council (CLC) ongoing leading to final regulatory approval (Mining Licence)**
- **Execution readiness activities**
  - Strategy to accelerate engineering activities to be aligned with forecast NdPr price increases from 2020

# Indicative Production Timeline

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\*Early Works Construction & Procurement to the items that follow are subject to:

- Product Offtake being secured
- Sufficient Project Funding secured
- Permitting and other related activities being completed
- Each previous activity being completed successfully

Delays to commencing Early Works Construction will also impact the timing of Plant Construction and Commissioning.



*Thank You*

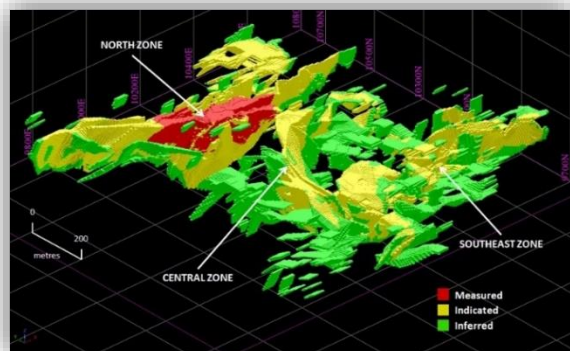
# Long Life Asset

RESOURCES	TONNES (m)	RARE EARTHS TREO %	PHOSPHATE P <sub>2</sub> O <sub>5</sub> %	NdPr Enrichment %
Measured	4.9	3.2	13	26.1
Indicated	30	2.7	12	26.4
Inferred	21	2.3	10	26.5
<b>TOTAL</b>	<b>56</b>	<b>2.6</b>	<b>11</b>	<b>26.4</b>

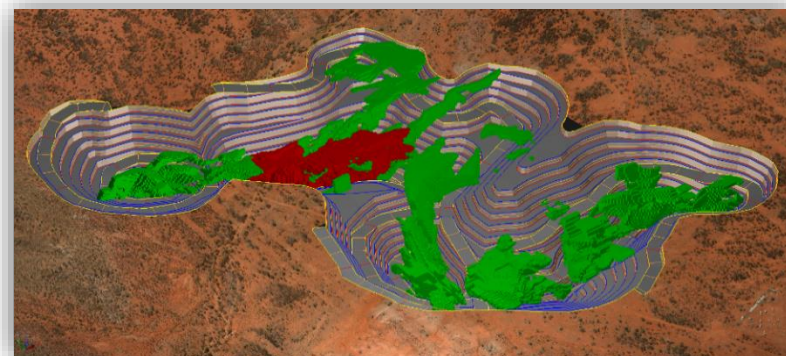
As announced on 7 June 2017. 1.0% TREO cut-off grade. Numbers may not compute exactly due to rounding. "NdPr enrichment" is the proportion of TREO comprising Nd<sub>2</sub>O<sub>3</sub> and Pr<sub>6</sub>O<sub>11</sub>.

RESERVES	TONNES (m)	RARE EARTHS TREO %	PHOSPHATE P <sub>2</sub> O <sub>5</sub> %	NdPr Enrichment %
Proved	4.3	3.1	13	26.1
Probable	14.9	2.9	13	26.5
<b>TOTAL</b>	<b>19.2</b>	<b>3.0</b>	<b>13</b>	<b>26.4</b>

As announced on 7 February 2019. Numbers may not compute exactly due to rounding. "NdPr enrichment" is the proportion of TREO comprising Nd<sub>2</sub>O<sub>3</sub> and Pr<sub>6</sub>O<sub>11</sub>.



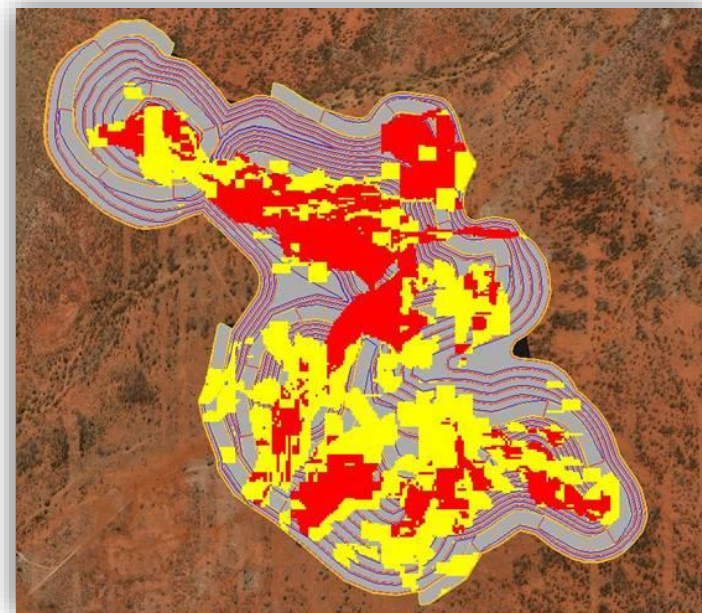
Mineral Resources



Ore Reserves

# Drilling & Metallurgical Program

- DFS completed in February 2019 included a mine life of 23 years based on Ore Reserves only but includes the costs of mining Inferred Resources within the LOM pit
- Targeted drilling and metallurgical program aims to substantially increase the current mine life beyond 23 years and further reduce operating costs
- Targeting improved conversion of Measured and Indicated Resources into Reserves
- Nolans ore body also remains open at depth



*Nolans DFS Pit Design*

- Mineral Reserves
- Inferred Mineral Resources not converted to Mineral Reserves

*Refer ASX announcement 7 February 2019: Nolans Project Definitive Feasibility Study*

# Drilling & Metallurgical Program

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*October 2019 – Drilling at Nolans Bore – hole NBDH1105*



*Northern Territory Senator Sam McMahon inspects drill core at Nolans Bore*



*Drill core sample from Nolans Bore used in flotation variability program*



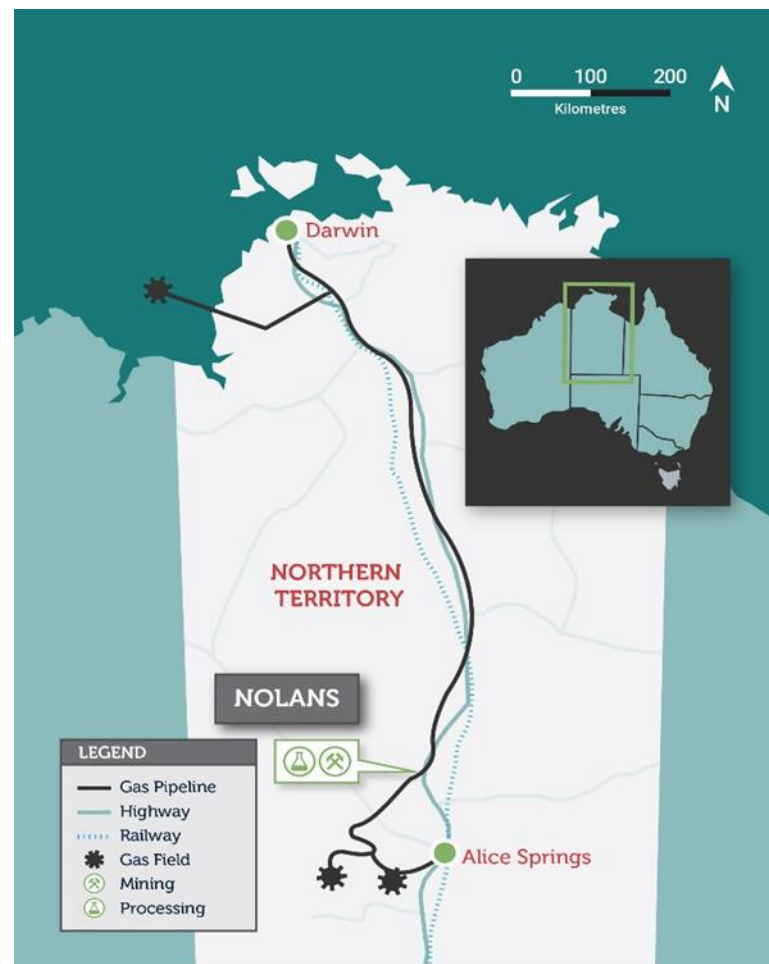
*October 2019 – Flotation variability test work at Nagrom mineral processing facility*

# DFS Completed February 2019

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Mining & Processing		
Mine Life (years)	23	
Concentrate (tpa)	293,000	
Production		
TREO equivalent (tpa)	13,343	
NdPr Oxide (tpa)	4,357	
Cerium Hydroxide (tpa TREO basis)	8,383	
SEG-HRE Carbonate (tpa TREO basis)	603	
Phosphoric Acid (tpa 54% P <sub>2</sub> O <sub>5</sub> MGA)	135,808	
Financial	US\$	A\$
Capital Cost (\$m)	726	1,006
Rare Earth Sales Revenue (\$m pa)	379	539
Phosphoric Acid Sales Revenue (\$m pa)	35	50
Mining Costs (\$m pa)	(30)	(43)
Processing Costs (\$m pa)	(103)	(148)
General & Administration Costs (\$m pa)	(15)	(21)
EBITDA (\$m pa)	266	377
KPI Analysis	US\$	A\$
Operating Cost \$/kg NdPr	34.07	48.40
Operating Cost \$/kg NdPr with MGA credit	25.94	36.85
NPV <sub>10</sub> after tax (\$m)	497	729
IRR after tax (%)	17.43%	
After tax payback	Year 5	
IRR 15% @ US\$/kg NdPr	76	
IRR 10% @ US\$/kg NdPr	59	

\* Production and financial data is calculated as the annual average following a three year ramp-up and excluding the partial final year production



Refer ASX announcement 7 February 2019: Nolans Project Definitive Feasibility Study

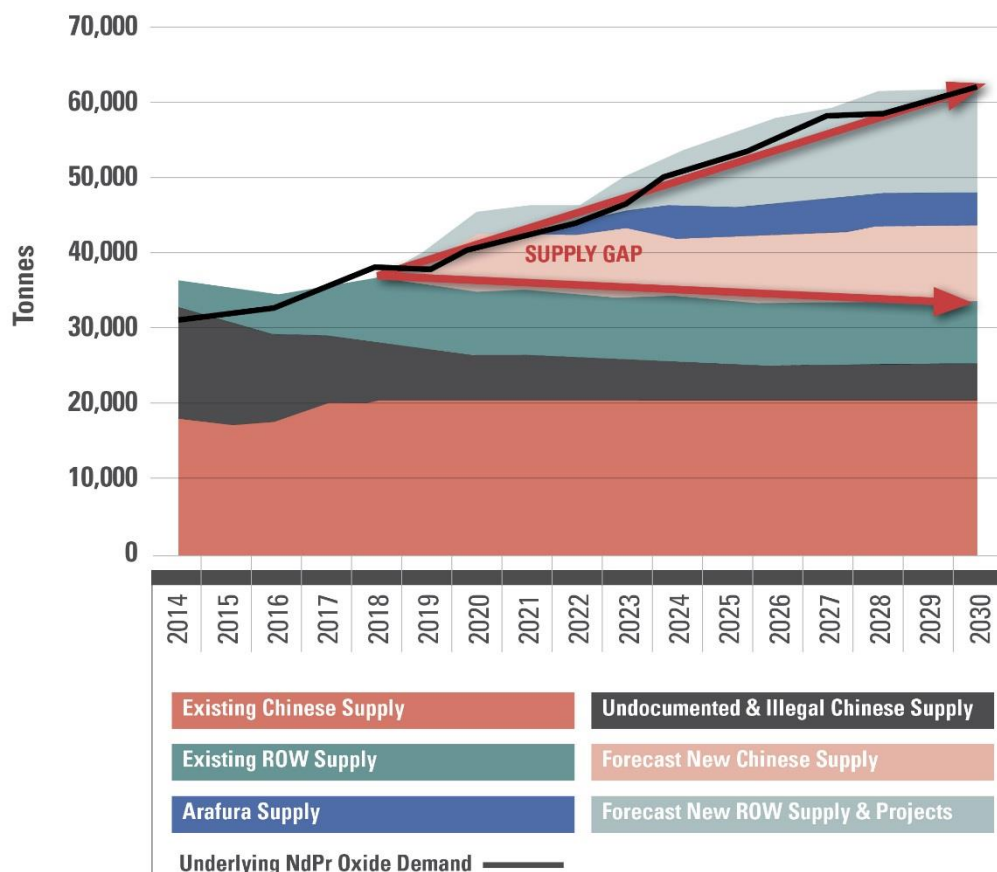


# Technology Program



# Supply & Demand Balance

## NdPr Oxide Supply & Demand



- China continues to dominate the global supply chain being the world's largest producer accounting for about 80% of NdPr for global NdFeB magnet production
- Supply reforms, industry consolidation and higher environmental standards will constrain China's ability to rapidly increase NdPr production
- Supply growth of 20,000 tonnes of NdPr oxide required in the next decade
- Lynas Corporation (ASX:LYC) is the only significant miner and processor of rare earth materials outside China enjoying a market capitalisation in excess of \$1bn
- China remains the dominant supplier, however analysts forecast China to become a net importer by the early 2020s

Source: Roskill Consulting (November 2018) – Rare Earths Market Analysis

# Experienced Board



**MARK SOUTHEY**  
NON-EXECUTIVE DIRECTOR

Mark Southey has previously held senior executive positions with Honeywell and ABB both in Australia and internationally, and more recently was part of the global executive leadership team within WorleyParsons, where he held the position of Group Managing Director for the Minerals, Metals and Chemicals Sector.



**CHRIS TONKIN**  
NON-EXECUTIVE DIRECTOR

Chris Tonkin has over 35 years' experience as a senior business executive with a broad industry background in business generation, management, and strategy development. He is a member of Arafura Resources' Remuneration and Nomination and Audit and Risk Committees and is also Chairman of Lakes Oil NL.



**GAVIN LOCKYER**  
MANAGING DIRECTOR

Gavin Lockyer's diverse, global experience has provided management and leadership opportunities in a range of disciplines including; Accounting, Financial & Investment Banking, Major Resource Development & Operations, and Global Bank Treasuries. Over the past 20 years his career has exposed him to business practices in North America, Europe, and Australasia.



**QUANSHENG ZHANG**  
NON-EXECUTIVE DIRECTOR

Quansheng Zhang holds a Doctoral degree in Engineering and a Masters degree in Geophysical Prospecting. He is based in Nanjing in the Peoples Republic of China and is the General Manager of Hong Kong East China Non-Ferrous Mineral Resources Co Ltd (HKECE). Quansheng has over 30 years of mineral prospecting and exploration experience, and expertise in mineral resource surveys and geophysics.

# Experienced Management



**RICHARD BRESCIANINI**  
GENERAL MANAGER EXPLORATION &  
BUSINESS DEVELOPMENT

Richard has over 30 years' experience in the minerals industry. He worked with BHP Minerals on base and precious metals exploration programs throughout Australasia and North America, contributing to significant economic discoveries at Eloise (copper-gold) and Cannington (silver-lead-zinc). Thereafter he led the Northern Territory Government's Geological Survey as its Director from 2003 to 2007 before joining Arafura.



**PETER SHERRINGTON**  
CHIEF FINANCIAL OFFICER & COMPANY  
SECRETARY

Peter commenced employment with Arafura in 2008 as Commercial Manager and was appointed Chief Financial Officer in July 2013. He has more than 20 years' experience in professional and corporate roles in Perth. Prior to working with Arafura, he held senior finance and commercial positions with several ASX and public unlisted entities. He has also worked in public practice for 10 years in the areas of business services and corporate advisory.



**LLOYD KAISER**  
GENERAL MANAGER SALES & MARKETING

Lloyd has more than 10 years' experience in the sales and marketing of industrial minerals into high value sector markets including the nuclear, automotive, and advanced ceramics sectors. Prior to joining Arafura, he held several senior positions in account management, business development and marketing across a diverse range of commodities and chemicals including alumina, coal, industrial minerals, refractories, and ceramics.



**BRIAN FOWLER**  
GENERAL MANAGER NT & SUSTAINABILITY

Brian has worked for over 40 years in private sector mineral companies developing a range of commodities, including rare earths, base metals, and gold. Brian is a member of the Northern Territory Mining Board, Management Board of the Northern Territory Minerals Council of Australia, and a member of Work Health & Safety Advisory Council of the Northern Territory.



**STEWART WATKINS**  
GENERAL MANAGER PROJECTS

Stewart has 25 years' experience in many facets of the mining industry including operations, engineering consulting, project development and management. Stewart is a Fellow of the AusIMM.