



## Arafura Resources Limited

*Up and coming supplier of NdPr to permanent magnets used in the growing clean energy industry*

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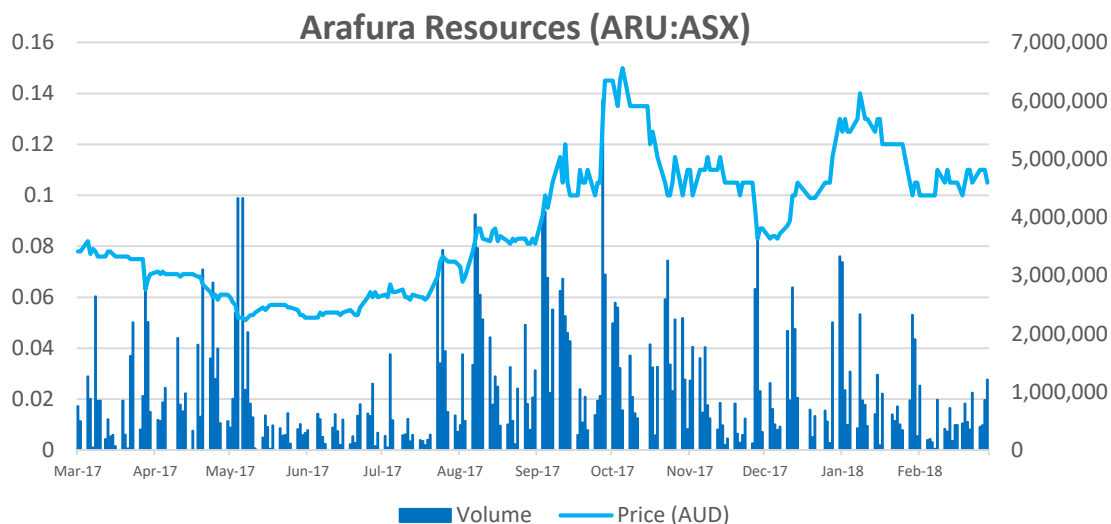
Mr Hussey is a full-time employee of Arafura Resources.

# Investment Highlights & Capital Structure

3

- **Nolans Project** in the Northern Territory, **low geopolitical risk**, **30+ year** mining and chemical processing operation
- One of the **largest and richest deposits of Neodymium-Praseodymium (NdPr)** in the world.
- Forecast operating costs are in the **lowest quartile**
- Capability of meeting **5-10% of global demand for NdPr**
- Afforded **major project status** by NT and Australian governments
- Nolans is in **advanced feasibility and environmental assessment**
- **Final Investment Decision targeted end 2018**

ASX Code	ARU
Share Price (31-Dec-17)	A\$0.099
Issued Shares	604.6m
Market Cap	A\$59.9m
Cash (31-Dec-17)	A\$12.7m
Debt	Nil



Top 5 Shareholders	
JP Morgan Nominees	20.47%
ECE Nolans Investment Co	19.05%
HSBC Custody Nominees	2.59%
Citicorp Nominees	2.31%
BNP Paribas Nominees	0.85%

4

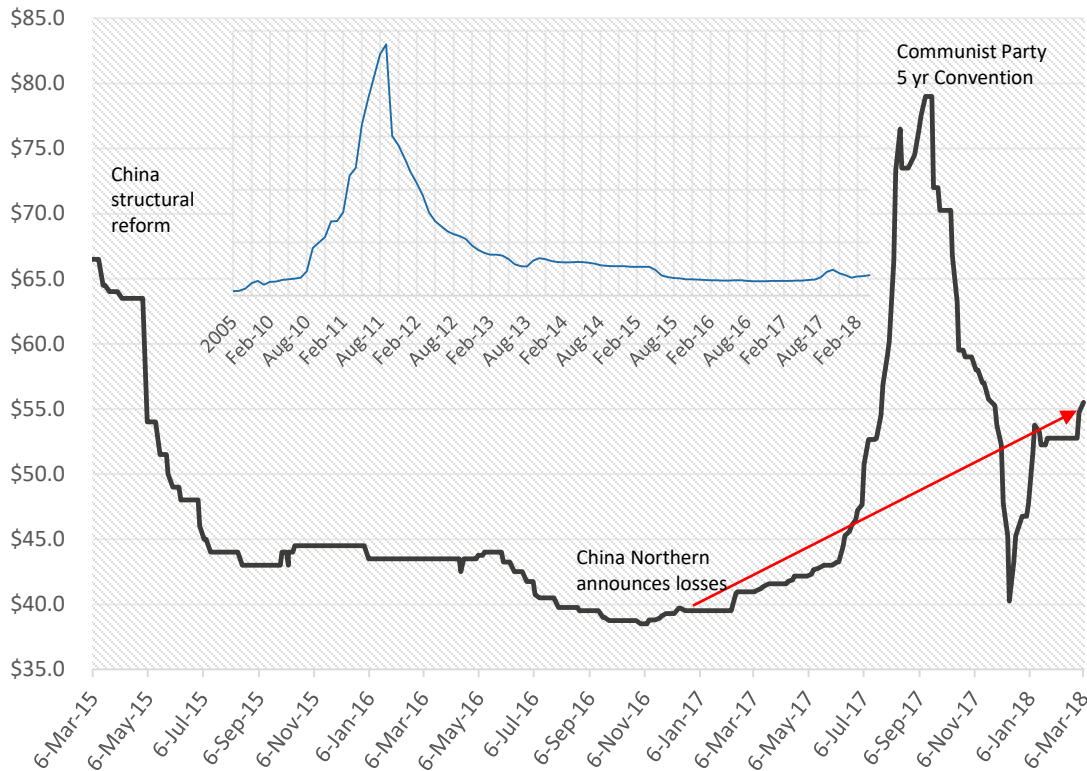
# NdPr Market Update

## Secure Supplier of NdPr to Permanent Magnets Used in Clean Energy

- **NdPr is a key component** in the manufacture of high-strength NdFeB permanent magnets used in electric vehicles (EVs), wind turbines, portable electronic devices, and many industrial applications
- EVs use an additional **1 kg of NdPr per electric motor** over a standard vehicle's use of 0.7 kg
- NdPr accounts for 26.4% of Nolans rare earths composition by volume and **85% by value**
- China has been the dominate NdPr producer but recently analysts are forecasting **China to become a net importer**
- Structural changes are being implemented in China to **weed out illegal operators, close unsustainable operations**, and push bigger players to consolidate

# NdPr Price – Supply & Environmental Reform

### NdPr Oxide Pricing 2015-2018



Source: Independent price reporting agency

- Removal of RE export tariffs and quotas
- Enforced closure of illegal and unsustainable mines and smelting impacted NdPr price in 2017
- China “big 6” consolidation creates a more sophisticated supply chain
- China rehabilitation costs yet to be realised
- Emerging demand for NdFeB magnets may also impact demand-supply balance

# NdPr Magnet vital to EV Market

7

## Permanent magnet synchronous motors (PMSM):

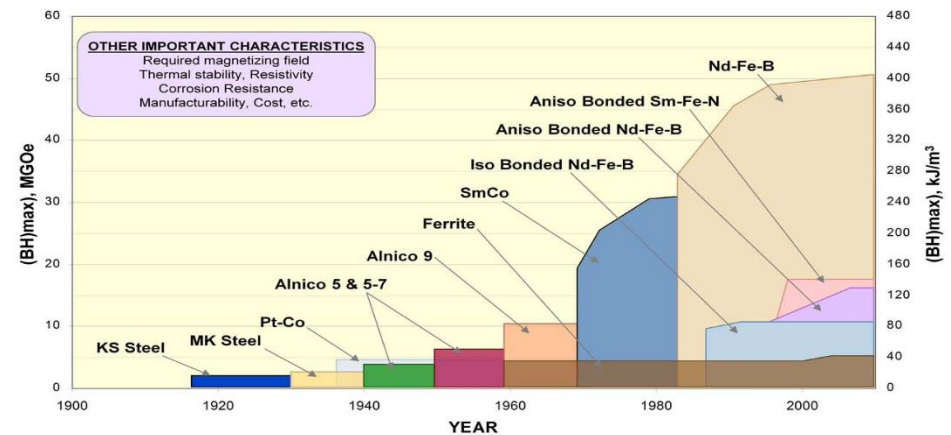
Dominant drive train technology for EVs. Recent announcements include:

- Most car manufacturers have EV targets of 10-60% by 2025
- Tesla moving to PMSM for mass produced Model 3
- Toyota to sell more than 10 EV models in 2020s and have EV versions of every Toyota and Lexus model by 2025 (Dec 2017)
- Ford increasing planned investment in EVs from US\$4.5 billion to US\$11 billion by 2022 and to introduce 16 EVs and 23 hybrid and plug-in hybrid models (Jan 2018)
- Electric vehicle demand forecasts range from 'big' to 'very big' (HSBC March 2018)
- OPEC raises forecast global electric vehicle sales in 2040 from 50 million to 250 million, Bloomberg forecasts 500 million (March 2018)

## Electric Vehicle (EV) Drivetrain: 1 kg of NdPr



## Improvement in Magnet Strength



Our World Touches Your World Every Day...

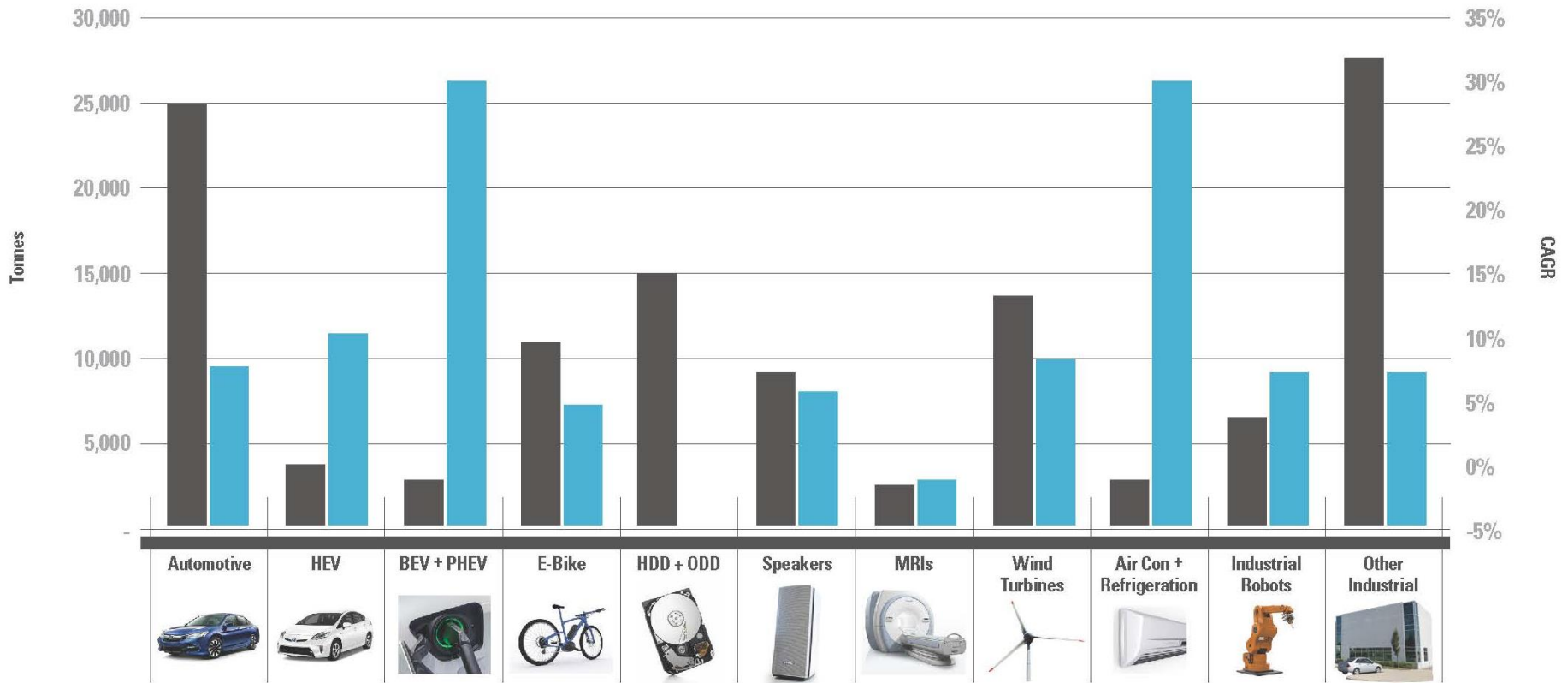
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34

# Established Markets & Growing Applications

## NdPr Magnet Volume & Forecast Growth

NdPr Magnet Tonnes 2016  
 Forecast CAGR% 2025

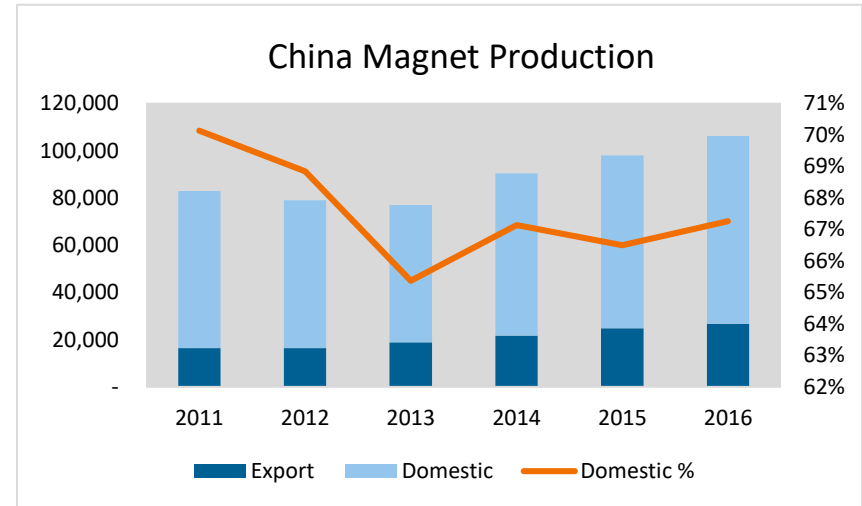
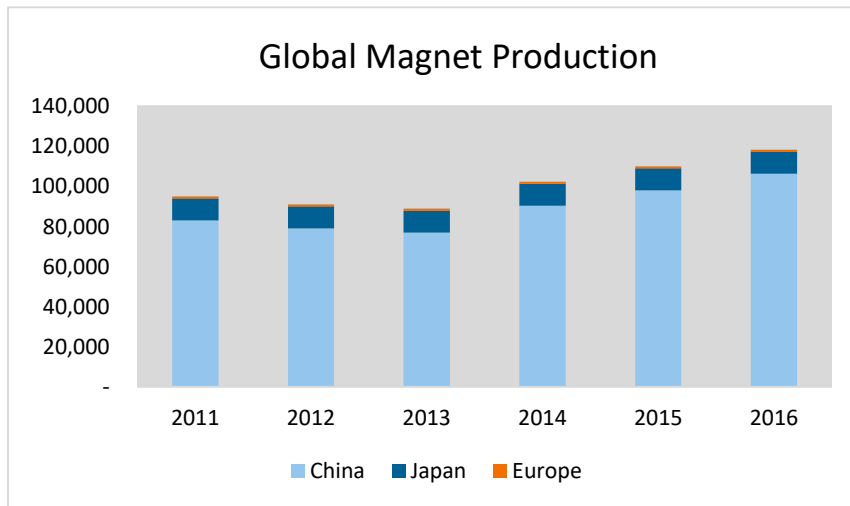


Source: Adamas Intelligence, Arnold Magnetic Technologies, Japanese industry participants, Roskill



# Emerging Demand Dynamic – China 2025 Strategy

- Steady increases in global magnet production 2014 to 2016, NdPr price movement indicates **continued growth for 2017**
- **China’s domestic consumption will increase** as it pursues clean energy objectives and global leadership in EV manufacture
- To maintain magnet production growth China will require **increased volumes of NdPr raw materials**, which conflicts with **currently constrained feedstock for local NdPr production**
- **By 2025 at current growth rates China will become a net importer of NdPr – who will supply this?**



Source: ACREI, Argus Metals and industry sources

# Non-China Supply Peer Comparison

10

- Non-China NdPr supply will be constrained by the **sector's historical inability to attract capital**
- **Nolans is one of the world's largest and more advanced undeveloped NdPr projects which provides investors with a compelling investment opportunity in a low-risk jurisdiction**
- Nolans has the potential to provide meaningful NdPr production in the **lowest cost quartile due to its NdPr enrichment**, and advanced project development status

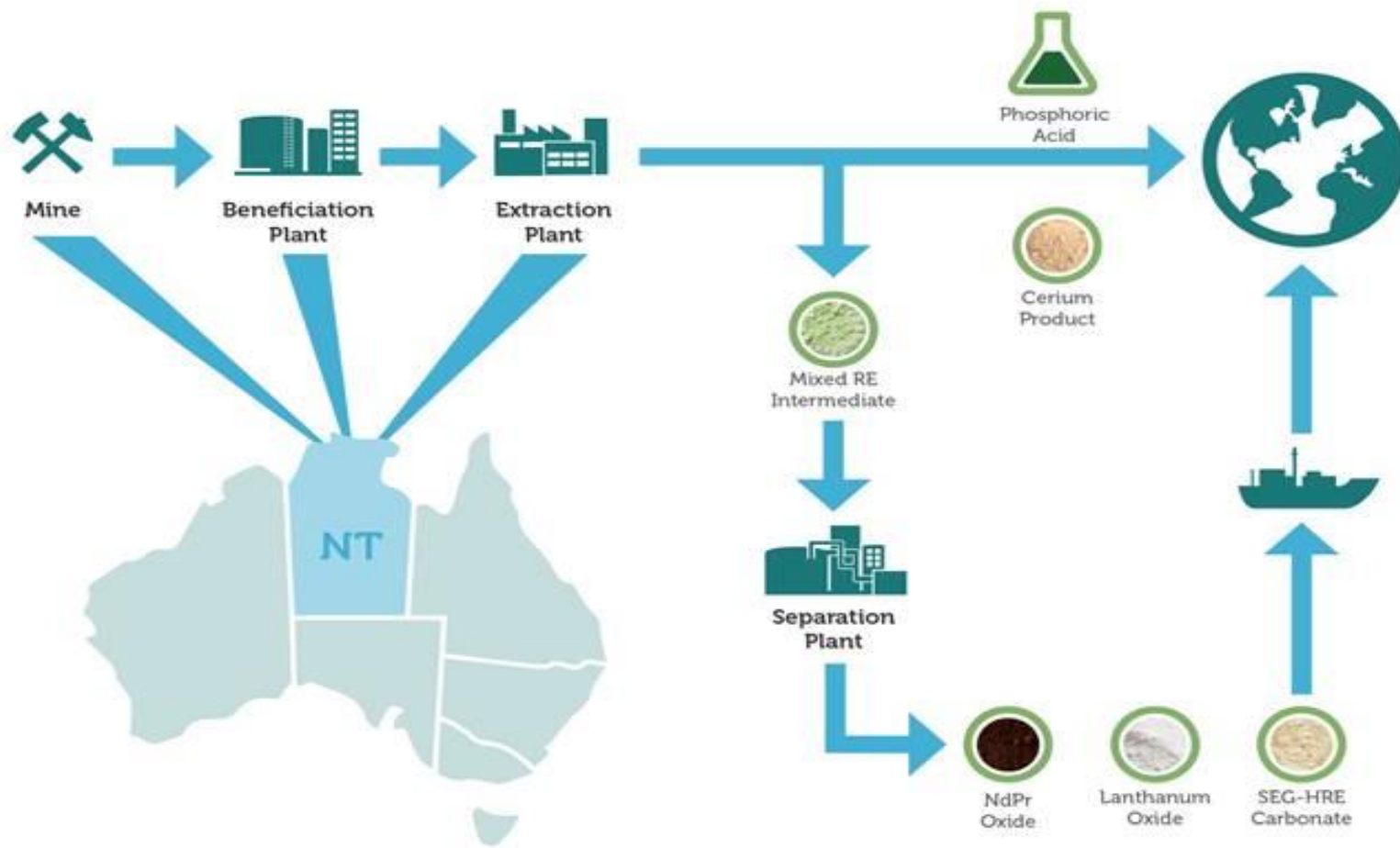
Asset	Nolans	Mount Weld/LAMP	Yangibana	Ngualla	Kvanefjeld
Owner	Arafura Resources	Lynas Corporation	Hastings Technology Metals	Peak Resources	Greenland Minerals and Energy
Country	Australia	Australia / Malaysia	Australia	Tanzania	Greenland
Status	Development	Production	Development	Development	Development
Contained NdPr (kt)	255	242	44	210	907
NdPr "enrichment" (%)	26.4%	23.3%	32.3%	21.2%	17.7%
Annual NdPr Production (kt)	3.6	5.2	2.8	2.8	5.3
OPEX (US\$/kg NdPr)	\$34.72	\$31.93	\$39.90	\$32.24	\$63.20
OPEX (US\$/kg NdPr) - after by-product credits	\$24.40	\$31.93	\$39.90	\$32.24	\$50.80

Source: Resource Capital Research Pty Ltd (AFSL 325340). See Appendix B for notes and assumptions used in the preparation of the Peer Comparison.

11

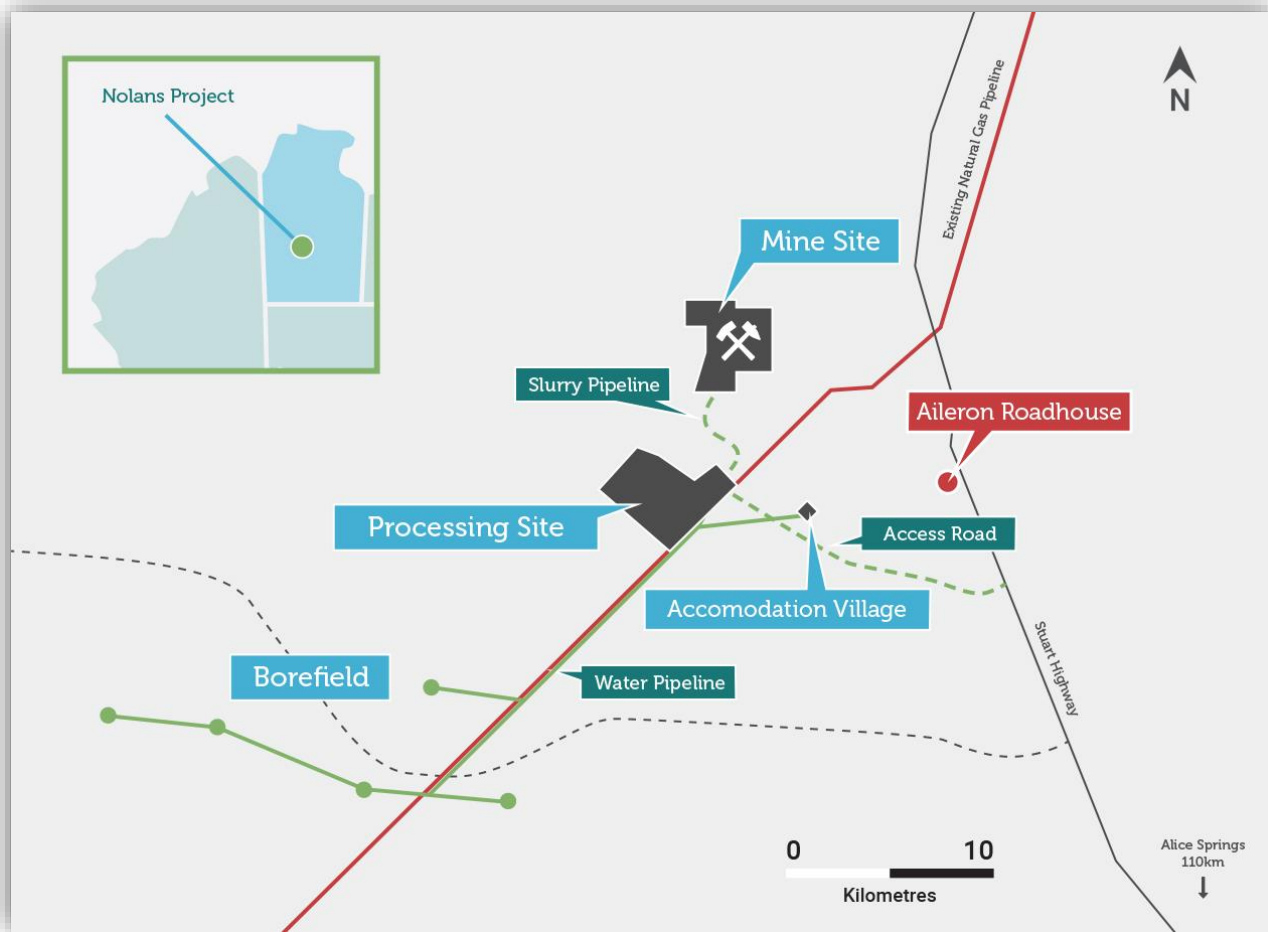
# Nolans Project

# Project Configuration



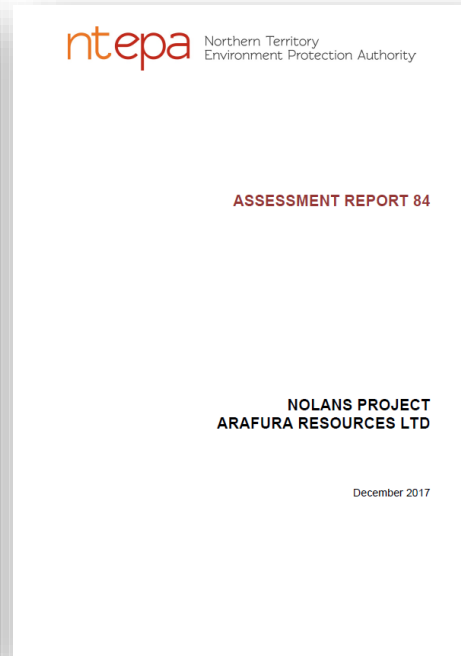
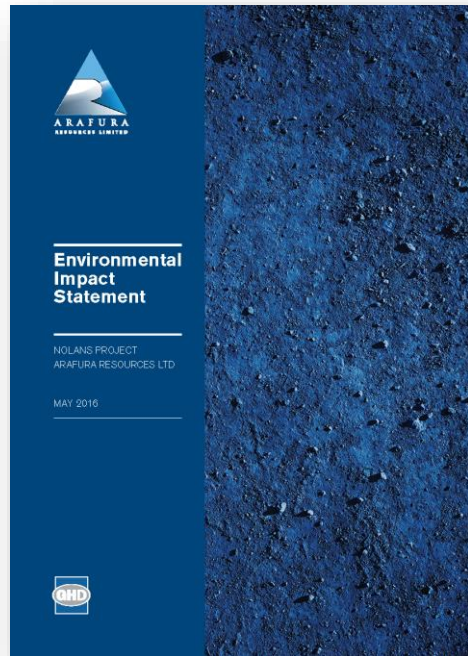
# Close To Key Infrastructure

13



- Stuart Hwy – **10 km east**
- Alice Springs railyard, airport and other services – **135 km south**
- Amadeus gas pipeline – **adjacent to processing site**
- Water supply – **30 km south**
- Tailings and process wastes **remain at site**

# Environmental Assessment Nearing Completion



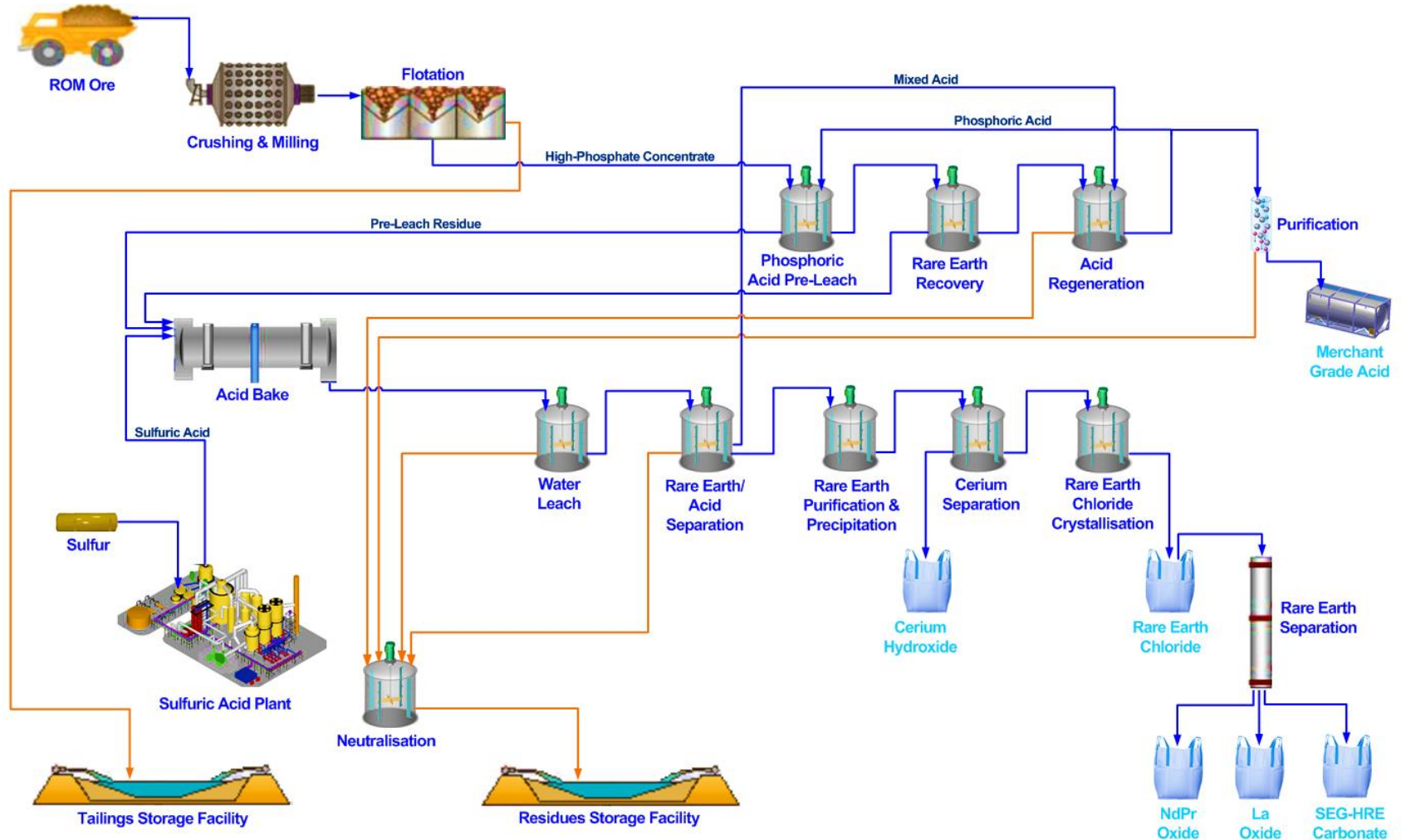
**NT Environment Protection Authority (EPA) Recommends Environmental Approval**

*“The NT EPA considers that ..... the Project can be managed in a manner that ..... avoids significant or unacceptable environmental impacts and risks.”*

Source: NT EPA Assessment Report 84, December 2017

# Project Flowsheet

15



# Pilot Scale Work Completed

16



**PHASE 1**

**Beneficiation**



**Beneficiation Pilot Plant**



**PHASE 2**

**Phosphate Extraction**



**Phosphoric Acid Regeneration Circuit**



**PHASE 3**

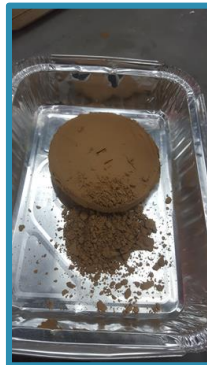
**Bulk Pre-Leach**



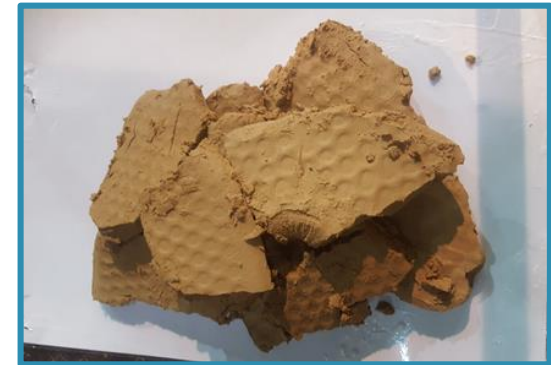
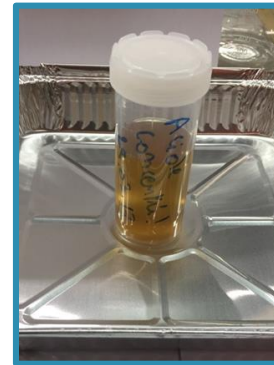
**Bulk Pre-Leach Pilot Plant**



**High-Phosphate Concentrate**  
 >82% NdPr & >90% P<sub>2</sub>O<sub>5</sub> Recovery



**Rare Earth & Phosphoric Acid Products**  
 3% TREO Loss to Waste Gypsum



**NdPr-Rich Pre-Leach Residue**



# Remaining Piloting Activities 2018

## Acid Bake Phase 4 Commenced



PLR and Acid Mixing



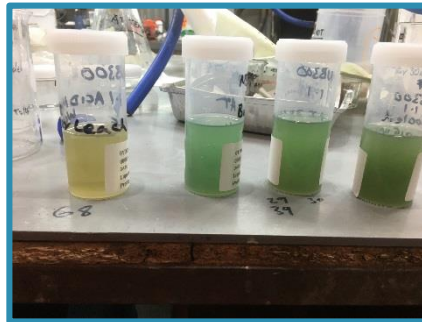
Baked Mixture Feeding



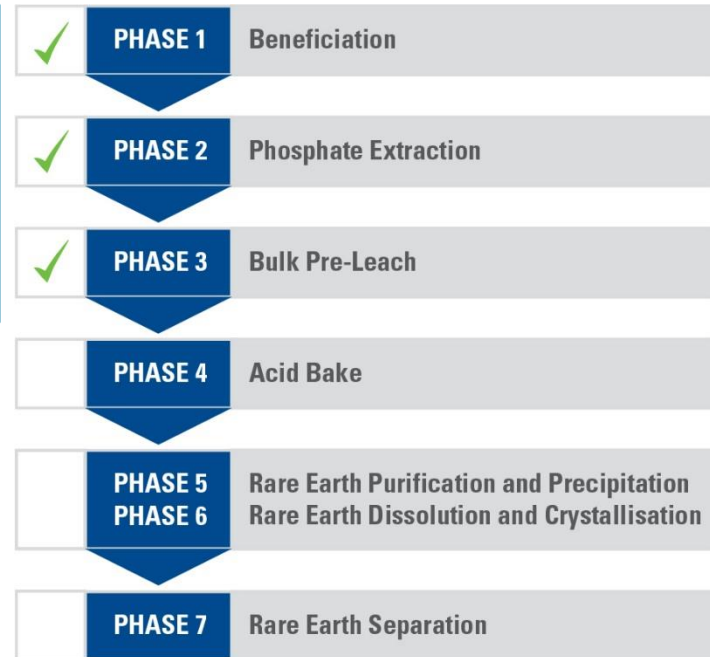
Acid Bake



Cooled Sulfated Product



Water Leach Liquor



NdPr Oxide



Cerium Carbonate



Lanthanum Oxide



SEG-HRE Carbonate

Customer qualified product suite produced from previous work

# Project Metrics

18

- **Ultra competitive operating costs**  
US\$6.23/kg TREO or US\$24.38/kg NdPr oxide – lowest amongst peers
- Phosphoric acid recovered to **reduce commodity risk**
- **High rare earths recovery**
- NdPr price as at 7/03/18 **US\$54.75**

*Refer Arafura ASX release 7 June 2017 for additional and qualifying information on the Mineral Resources that underpin the production target and provides the material assumptions on which the production target is based*

*The Company confirms that all material assumptions underpinning the forecast financial information derived from its 14,000 tpa TREO production target and the production target itself, continue to apply and have not materially changed since the 7 June 2017 ASX release*

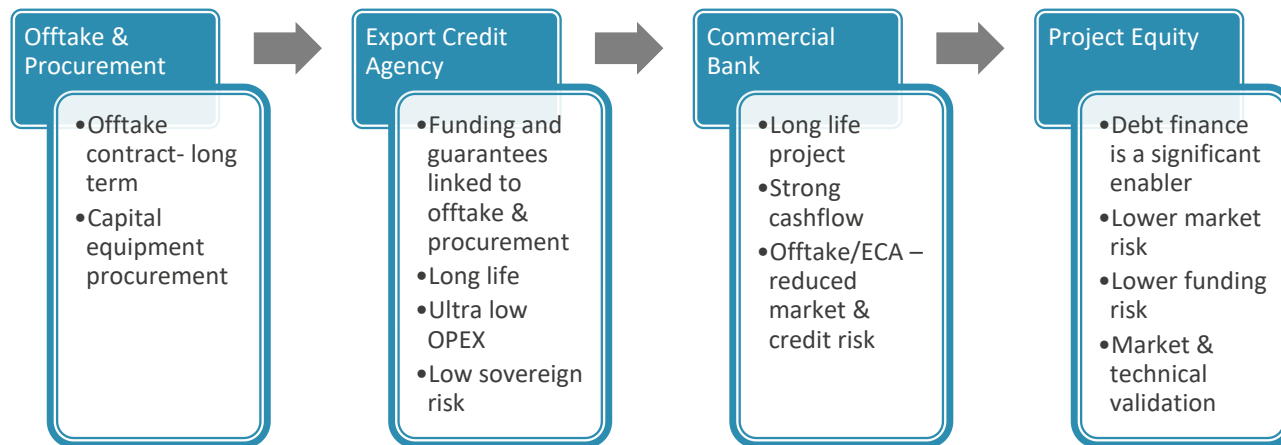
*Based on 14,000 tpa TREO production processing Measured and Indicated Mineral Resources as per Appendix A*

Mining & Processing		
ROM feed (tpa)	525,000	
Mine life (years)	30+	
Recovery (ROM to final product)	Total RE	76%
	NdPr	75%
	La	75%
	SEG-HRE	68%
Production		
TREO equivalent (tpa)	14,000	
NdPr oxide (tpa)	3,600	
La oxide (tpa)	2,660	
SEG-HRE carbonate (tpa TREO equivalent)	660	
Phosphoric Acid (tpa MGA)	110,000	
Financial		
Capital cost (US\$m)	\$680	
Operating cost (US\$m pa)	\$125	
Operating cost (US\$/ kg TREO)	\$8.89	
Operating cost (US\$/ kg TREO; less credit phos acid)	\$6.23	
Operating cost (US\$/ kg NdPr; less credit phos acid)	\$24.38	

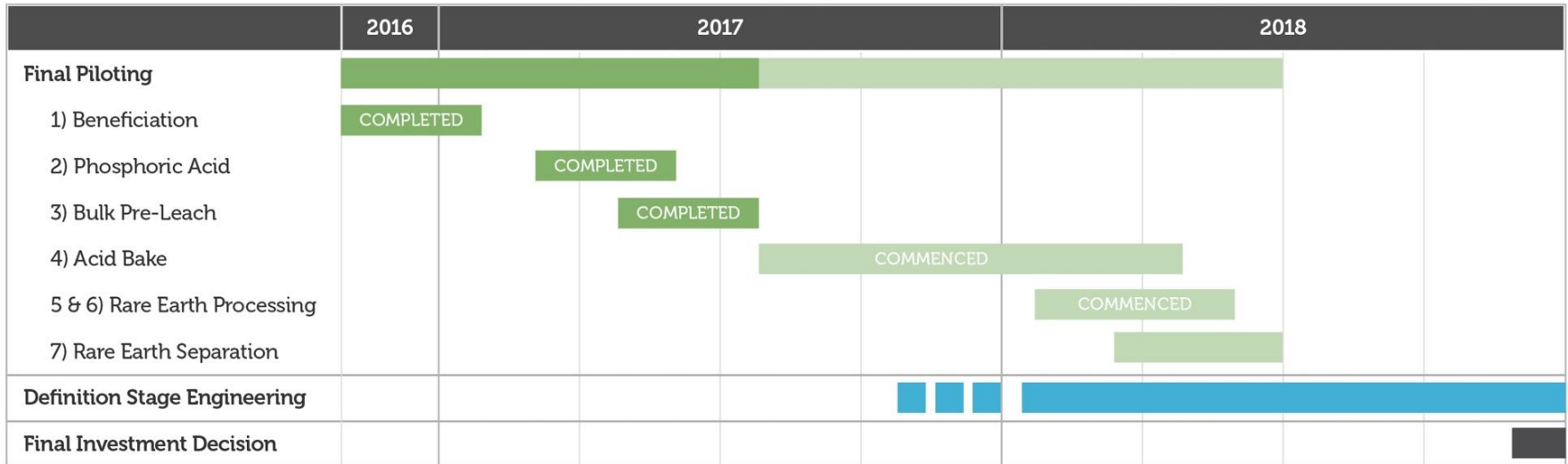
# Project Funding Strategy

19

- **Advancement of environmental approval critical enabler** for engagement with offtakers, financiers & Export Credit Agencies (ECA)
- ECAs are key to providing government-backed funding and guarantees, leveraged against the strategic link to NdFeB magnet production
- ECA funding linked to offtake arrangements, capital equipment supply and construction
- ECA-linked project finance is a catalyst to attract equity at corporate and/or project level



# Piloting & Final Feasibility



## 2018 Targets include:

- Securing **environmental approvals**
- Advancing **NdPr offtake arrangements**
- Completing the **DFS and definition stage engineering**
- Engaging with **strategic partners for capital equipment procurement and project funding**

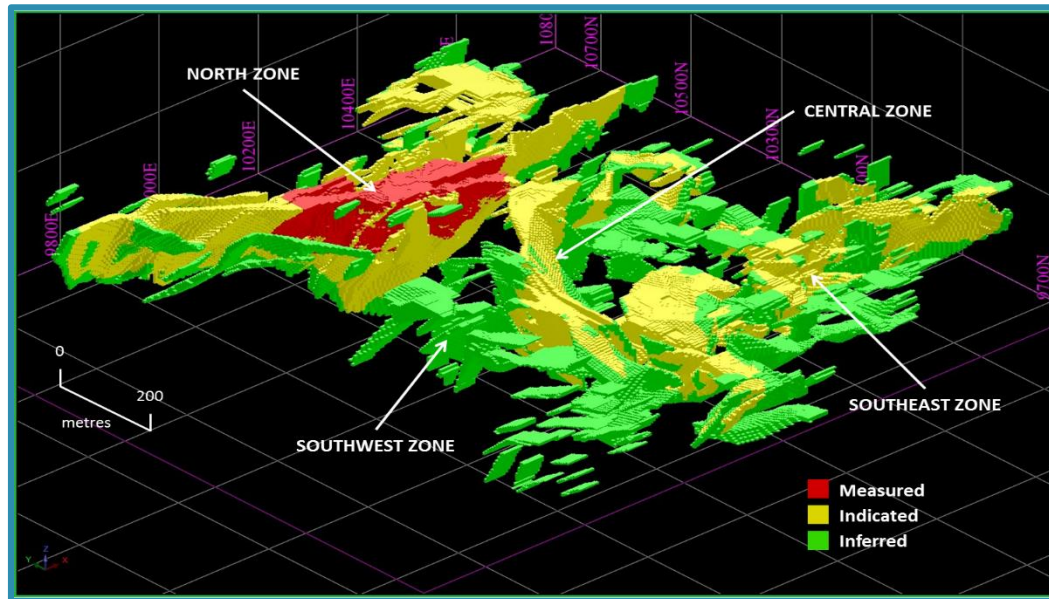
# Summary

Attribute	Arafura
High-growth and high-value <b>NdFeB permanent magnet focus</b>	✓
NdPr production planned to <b>coincide with projected supply gap</b>	✓
<b>Lowest production cost</b> to remain competitive in a cyclical downturn	✓
Located in a jurisdiction with <b>low geopolitical risk and with strategic support</b>	✓
Long-life, low-risk resource with planned output that supports <b>&gt;30 years of production</b>	✓
Close to vital <b>transport, energy and water infrastructure</b>	✓
Regulatory approvals well advanced, including <b>all-important environmental</b>	✓
Dedicated team that has developed an <b>efficient, high-recovery flowsheet now in final piloting phase</b>	✓

# Appendix A: Mineral Resources

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>

1% 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>.



# Appendix B: Peer Comparison

## Notes and assumptions used in the preparation of the Peer Comparison

- Exchange rate of AUD1 = USD 0.795.
- Forecast operating data for development projects based on published company reports and project updates. ARU operating expense includes provision for staff and administration costs.
- NdPr “enrichment” (%) is based on published company reports and project updates for rare earth element distribution for mineral resources or reserves where applicable.
- Contained NdPr (kt) is based on reserves or Measured and Indicated mineral resources where no reserves quoted.
- Contained NdPr (kt) and Annual NdPr Production (kt) is presented on a project basis. NdPr production has not been adjusted to reflect the relevant underlying project interest for PEK (75%) and HAS (91%).
- LYC Annual NdPr Production (kt) is based on total reported “ready for sale production volumes” for the year ending 30 June 2017. Operating costs are based on total operating costs, staff and administration cashflows reported for the 12 month period ending 30 June 2017. Operating cashflows have been converted at an average exchange rate of AUD1= USD 0.755 for that year.

## ASX-Listed Peer Group Companies

Code	Company Name	Project	Location	Project Interest
ARU	Arafura Resources Ltd	Nolans	NT	100%
LYC	Lynas Corporation Ltd	Mt Weld/LAMP	WA & Malaysia	100%
HAS	Hastings Technology Metals Ltd	Yangibana	WA	91%
PEK	Peak Resources Ltd	Ngualla	Tanzania	75%
GGG	Greenland Minerals and Energy Ltd	Kvanefjeld	Greenland	100%

Source: Resource Capital Research Pty Ltd (AFSL 325340) report dated 19 October 2017