



# Ardea Resources Limited

Ardea Resources is an Australia - focused  
developer and explorer

## DEVELOPING

the Goongarrie  
Nickel Cobalt Project

## EXPLORING

for Western Australian  
Gold and Nickel Sulphides

## DIVESTING

our New South Wales  
Gold and Base Metal Projects

**30 July 2019 Sprott Natural Resource Symposium Presentation**

Presented by Andrew Penkethman

# Disclaimer

## Important notice

This presentation contains general information only and is, or is based upon, information which has been released to ASX or is contained in the Company's prospectus dated 9 November 2016 (including supplementary prospectuses dated 18 November 2016 and 6 January 2017), the Goongarrie Nickel Cobalt Project Pre-Feasibility Study (dated 28 March 2018) the Goongarrie Expansion Study (24 July 2018), Goongarrie Pilot Plant trial produces battery grade crystals (31 October 2018), Lewis Ponds met testwork produces high grade concentrates (26 November 2018), Goongarrie Nickel Cobalt Project Update (8 April 2019), Drilling at Gale identifies large scale gold system (11 April 2019), Ardea advances NSW Gold and Base Metals IPO (29 April 2019), Ardea Quarterly Operations Report, for the quarter ended 31 March 2019 (30 April 2019), Ardea Quarterly Operations Report, for the quarter ended 30 June 2019 (22 July 2019) and Nickel sulphide exploration commences at Perrinvale Project (24 July 2019). This presentation is not an invitation, offer or recommendation (express or implied) to subscribe for, or apply for the purchase of, or to take any other action in respect of securities of any entity described herein and is not a prospectus, product disclosure statement or disclosure document for the purposes of the Corporations Act 2001 (Cth) and has not been lodged with ASIC. None of Ardea Resources Limited (Ardea or the Company) or its representatives are providing or offering investment advice or services by making this presentation.

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The Goongarrie Project has completed the Pre-Feasibility Study phase and has commenced programs that are part of the Definitive Feasibility Study. Though reasonable care has been taken to ensure that the facts are accurate and/or that the opinions expressed are fair and reasonable, no reliance can be placed for any purpose whatsoever on the information contained in this document or on its completeness. Actual results and developments of projects and the market development may differ materially from those expressed or implied by these forward looking statements depending on a variety of factors. A key conclusion of the Pre-Feasibility Study and Expansion Study, which is based on forward looking statements, is that the Goongarrie Project is considered to have positive economic potential.

No stock exchange, regulation services provider, securities commission or other regulatory authority has approved or disapproved the information contained in this news release.





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Is an Australia-focused developer and explorer

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## DEVELOPING

the Goongarrie  
Nickel Cobalt Project



*Nickel Sulphate crystals from  
ARL pilot plant work*

2

## EXPLORING

for Western Australian  
Gold and Nickel Sulphides



*Gold nuggets recovered from  
ARL WA tenements*

3

## DIVESTING

our New South Wales  
Gold and Base Metal Projects



*3D model of Mt Aubrey epithermal  
gold system*

# Corporate Snapshot

## Capital Structure, as at 22 July 2019

Shares on Issue	106,145,424
Share Price (22 July 2019)	\$0.50
52 week high / low	\$0.895 / \$0.355
Cash (30 June 2019)	\$11.2 million
Market Cap (22 July 2019)	\$53.1 million
Unlisted Stock \$0.25 options (IPO)	11.155 million
Staff performance rights	5.161 million

Ian Buchhorn and associates	11.3%
Brian O'Shannassy and associates	9.3%
Citicorp Nominees	8.3%
BNP Paribas Nominees	5.1%
JP Morgan Nominees	5.1%

Top 20 shareholders hold: 55%

Katina Law	Executive Chair
Ian Buchhorn	Executive Director
Wayne Bramwell	Non-Executive Director
Andrew Penkethman	Chief Executive Officer
Sam Middlemas	Chief Financial Officer
Dr Matt Painter	GM - Exploration

*Experienced management team with global experience in the resources sector, from corporate fundraising, exploration, discovery, feasibility studies, development and operations.*

***Ardea has a quality project portfolio and the team to make their projects succeed.***

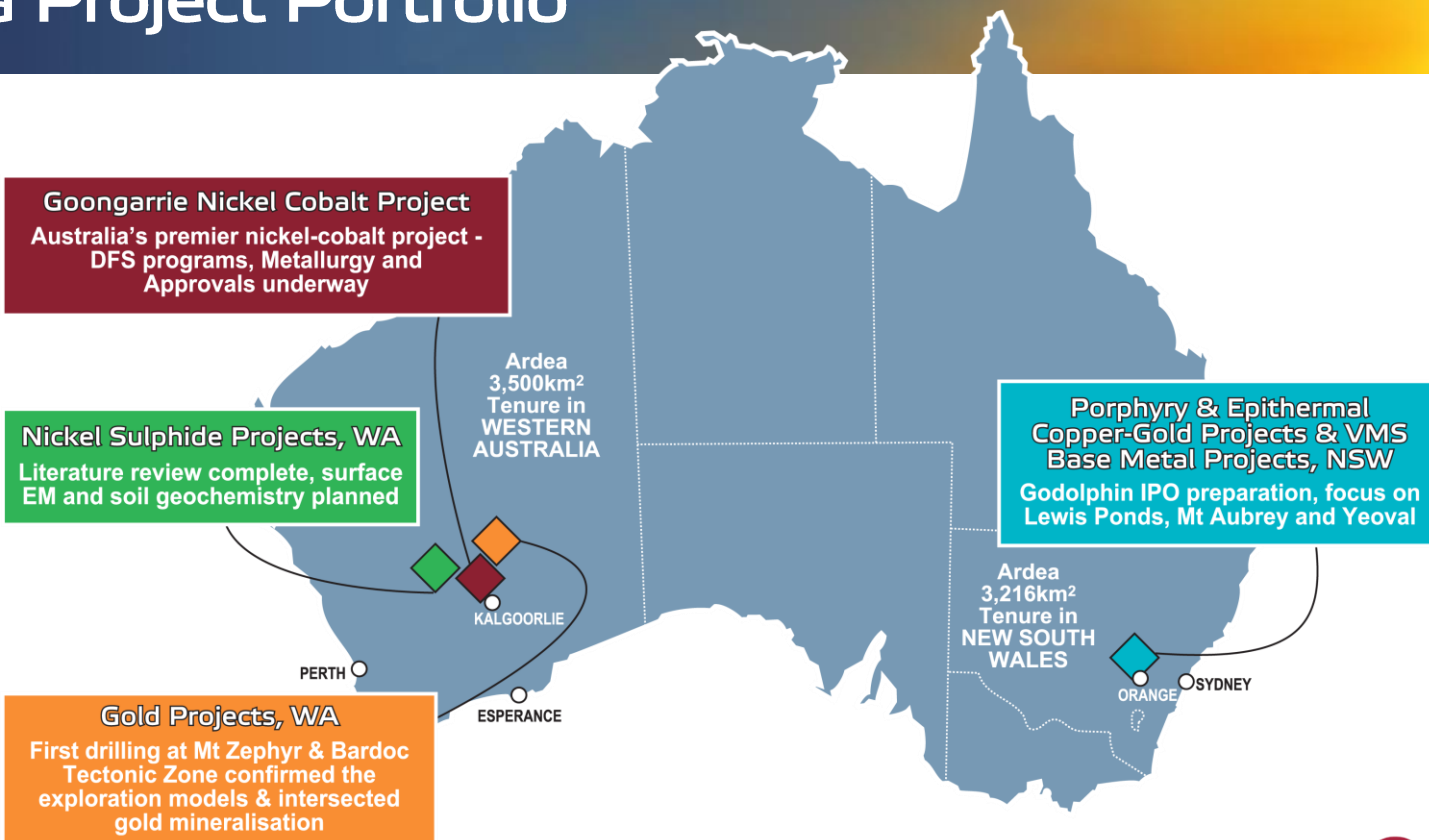


## Share Price Performance



Share price performance and volume since listing (9 February 2017)

# Ardea Project Portfolio





1

# DEVELOPING

## the Goongarrie Nickel Cobalt Project

Ardea's flagship is Australia's  
premier Nickel Cobalt Project

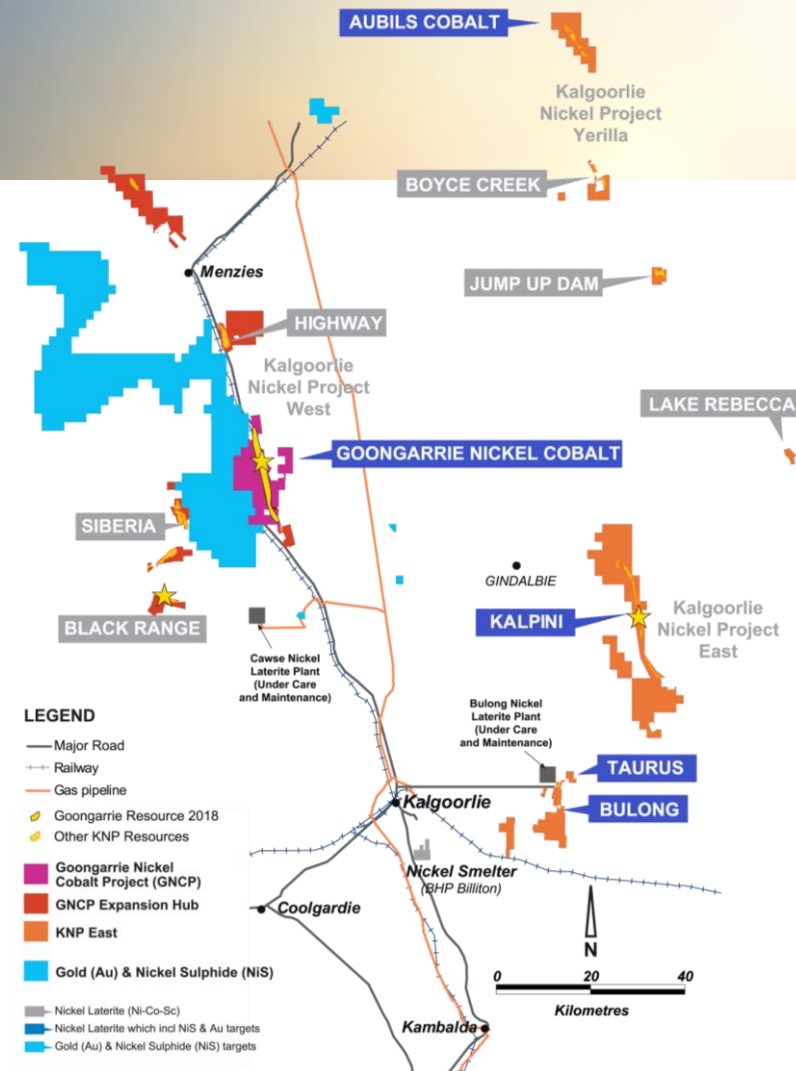


*Looking towards the plant site at Goongarrie adjacent to the Goldfields Highway, looking NE*

# The Kalgoorlie Nickel Project

- **Kalgoorlie Nickel Project (KNP)** has a **globally significant nickel and cobalt resource of 773Mt at 0.7% Ni and 0.05% Co\***
  - 5.6 million tonnes contained Nickel
  - 405,000 tonnes contained Cobalt
- The **Goongarrie Nickel Cobalt Project (GNCP)** is part of the broader KNP, with a resource of 216Mt at 0.71% Ni and 0.06% Co\*
  - 1.5 million tonnes contained Nickel.
  - 130,700 tonnes contained Cobalt
  - **LOM production of nickel sulphate is 2.04Mt, cobalt sulphate is 259.2Kt, with plant feed grade for 25 years of 0.88% Ni and 0.10% Co<sup>2</sup>.**
- Potential for **multiple processing hubs** and **multi-decade mine life**
- These projects provide potential satellite high grade feed options for the GNCP plant or additional processing hubs

1. \* See Appendix for resource breakdown  
 2. Per Goongarrie Expansion Study ASX release, 24 July 2018. All the material assumptions underpinning the forecast financial information derived from a production target, in the initial public report referred to in rule 5.17 continue to apply and have not materially changed.



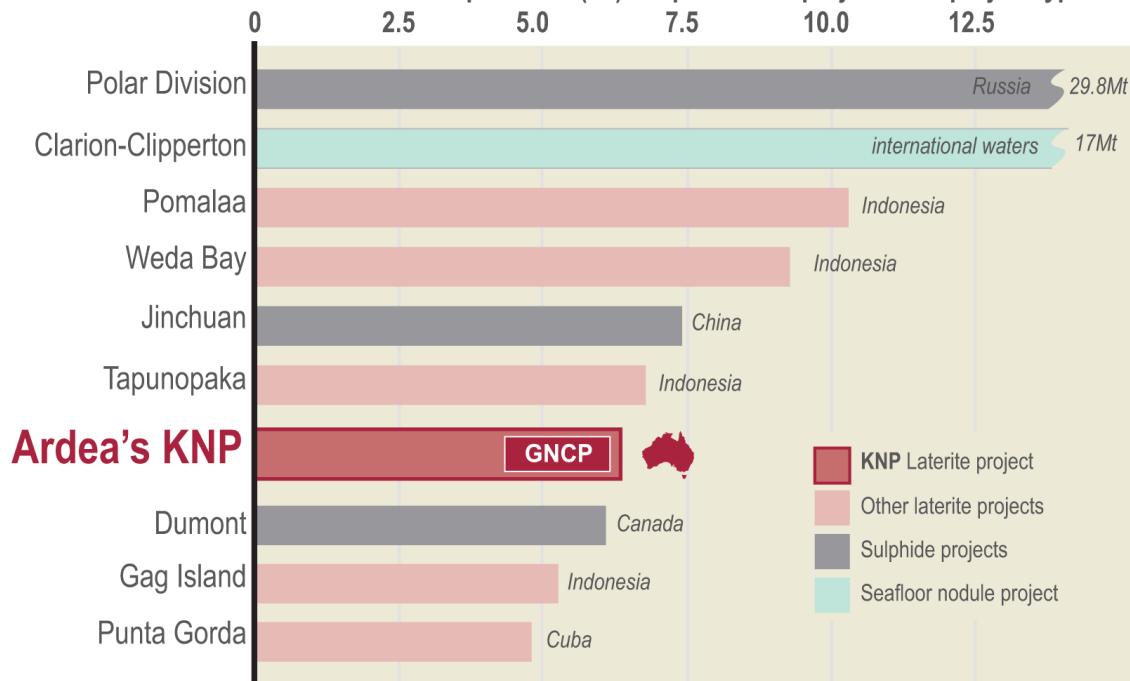
# KNP is globally significant



## GLOBAL PEERS

**KNP - Largest and only Australian Nickel Project of any type amongst the top 10 globally by contained metal**

Contained nickel equivalent\* (Mt) - Top 10 nickel projects - all project types



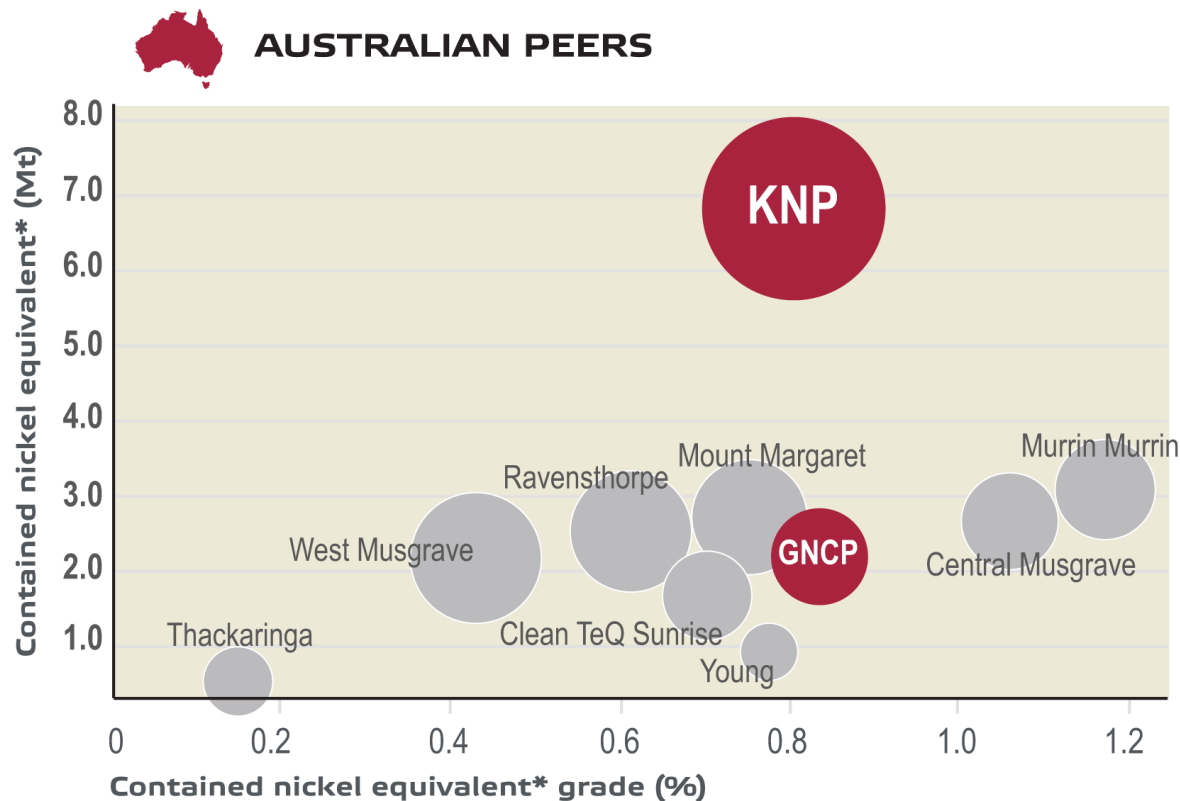
Source: SNL database & Ardea Company data (KNP only).

\* Nickel equivalents defined using the following values (9 July 2019, US\$ price): Ni (\$12,646.50/t), Co (\$26,647/t), Cu (\$5,808.50/t). Ni equivalent grade (Ni eq. %) =  $Ni(\%) + 2.107 \times Co(\%) + 0.459 \times Cu(\%)$ . Recoveries were not considered for high-level comparison purposes. These values used for nickel equivalent calculations throughout this document. Nickel equivalents are used because nickel is the major proportion of the deposit by value, and these values allow for direct comparison to major deposits globally.





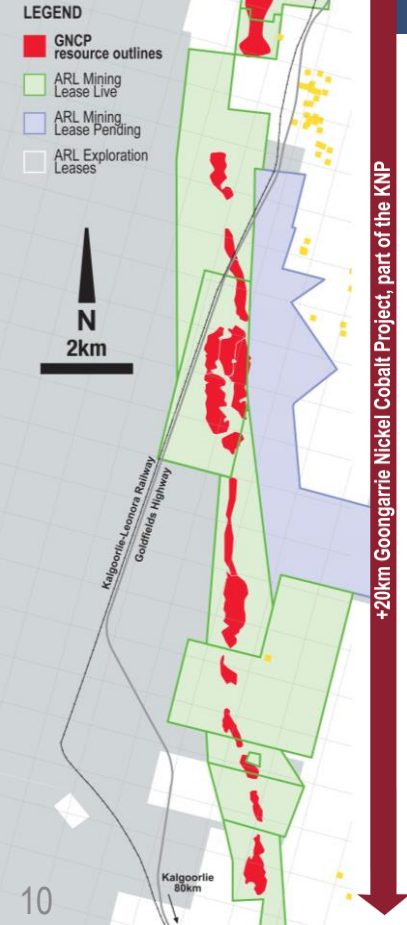
# KNP and GNCP are world class and largest in Australia



Source: SNL database & Ardea Company data (KNP & GNCP only).

\* Nickel equivalents defined using the following values (9 July 2019, US\$ price): Ni (\$12,646.50/t), Co (\$26,647/t), Cu (\$5,808.50/t). Ni equivalent grade (Ni eq. %) =  $\text{Ni}(\%) + 2.107 \times \text{Co}(\%) + 0.459 \times \text{Cu}(\%)$ . Recoveries were not considered for high-level comparison purposes. These values used for nickel equivalent calculations throughout this document. Nickel equivalents are used because nickel is the major proportion of the deposit by value, and these values allow for direct comparison to major deposits globally.

# Goongarrie Nickel - Cobalt Project Highlights



The 100% owned GNCP is part of the largest Nickel Cobalt Resource in the developed world^

- Potential multi-decade producer of high-quality nickel and cobalt sulphate
- 100% nickel and cobalt offtake available
- 1.0Mtpa base case PFS – low CAPEX start-up with robust project economics\*
- 2.25Mtpa expanded case – mill feed grades **0.88% Ni and 0.10% Co\***
- Low technical risk project to provide nickel and cobalt for the growing battery (Electric Vehicle and Static Storage Battery) market
- DFS programs underway
- Strategic partner interest is high as concerns rise around **secure long-term supply of battery grade nickel and cobalt**

Refer to ASX releases: ^Ardea Resources Annual Report 2017. \*Goongarrie Nickel Cobalt Project, PFS study, 28 March 2018 & Goongarrie Expansion Study, 24 July 2018. All the material assumptions underpinning the forecast financial information derived from a production target, in the initial public report referred to in rule 5.17 continue to apply and have not materially changed.

*Cobalt sulphate produced from Goongarrie ore*

# A High Quality Nickel and Cobalt Sulphate Project

## Outstanding results delivered from PFS\* and Expansion Studies completed in 2018:

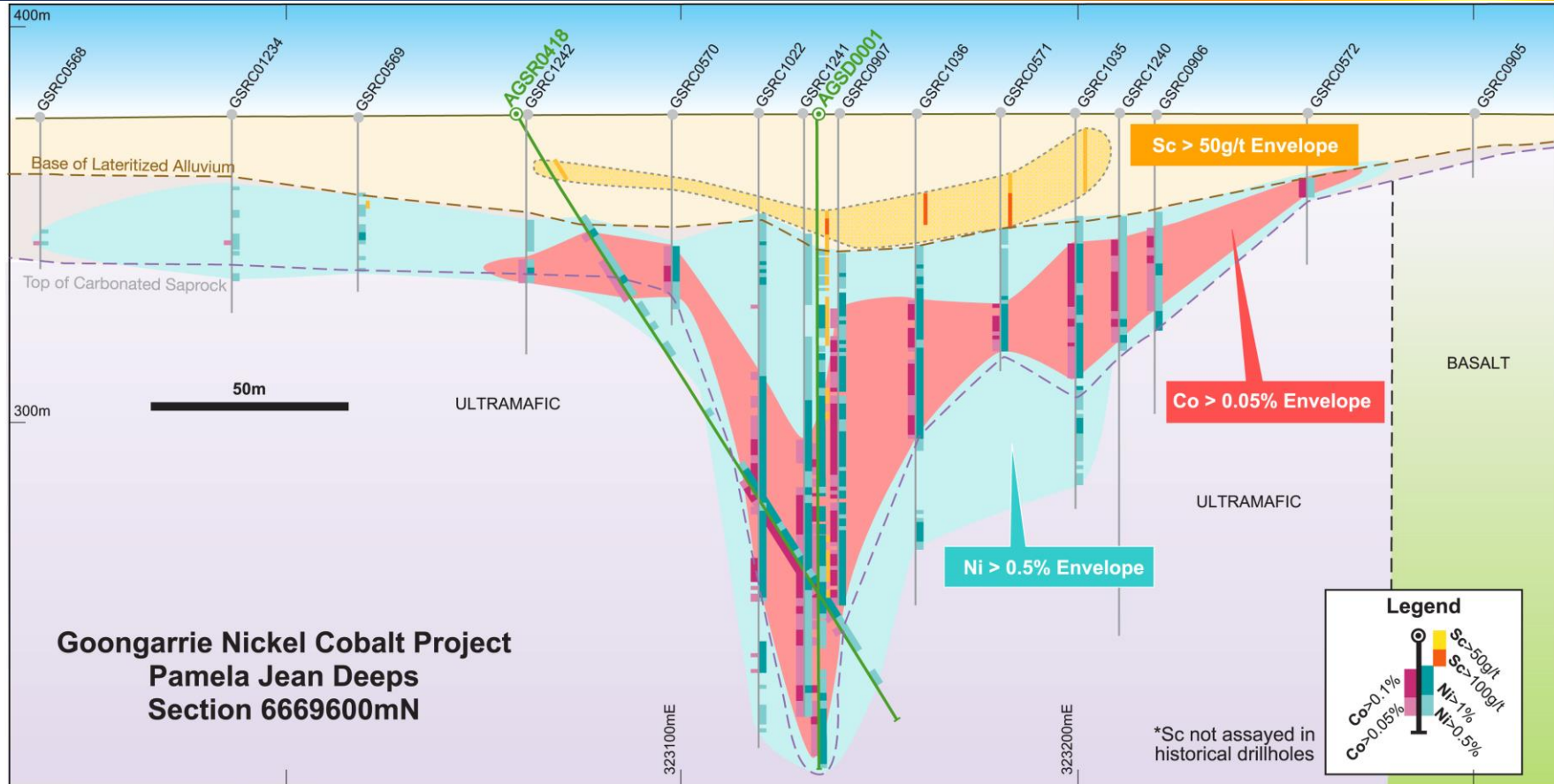
	1.0Mtpa	1.5Mtpa	2.25Mtpa
<i>Status</i>	PFS	PFS	ES
<i>No. Trains</i>	1	1	1
<i>Pre Tax NPV<sub>8</sub></i>	US\$ 1.13 billion	US\$ 1.52 billion	<b>US\$ 2.4 billion</b>
<i>Pre Tax IRR</i>	29 %	29 %	<b>31%</b>
<i>CAPEX</i>	US\$ 472 million	US\$ 588 million	<b>US\$918 million</b>
<i>C1 cash cost</i>	US\$ 0.42 / lb	US\$ 0.45 / lb	<b>US\$ (0.34) / lb</b>
<i>Payback</i>	5.3 years	5.6 years	<b>5.1 years</b>
<i>Cobalt sulphate</i>	5,500tpa	6,900tpa	<b>10,000tpa</b>
<i>Nickel sulphate</i>	41,500tpa	55,300tpa	<b>81,000tpa</b>

- ✓ PFS of 1Mtpa and 1.5Mtpa base case over a 25-year mine life completed
- ✓ Expansion study of 2.25Mtpa with a 25-year mine life completed
- ✓ 94.5% nickel and 95.5% cobalt recovery – life of mine
- ✓ Pre-cobalt credit C1 costs in line with current worldwide operators
- ✓ Pressure Acid Leach (PAL) 5th generation plant is a proven design, successfully operated in other laterite projects globally
- ✓ 2.25Mtpa case based on only 26% of Goongarrie Resource

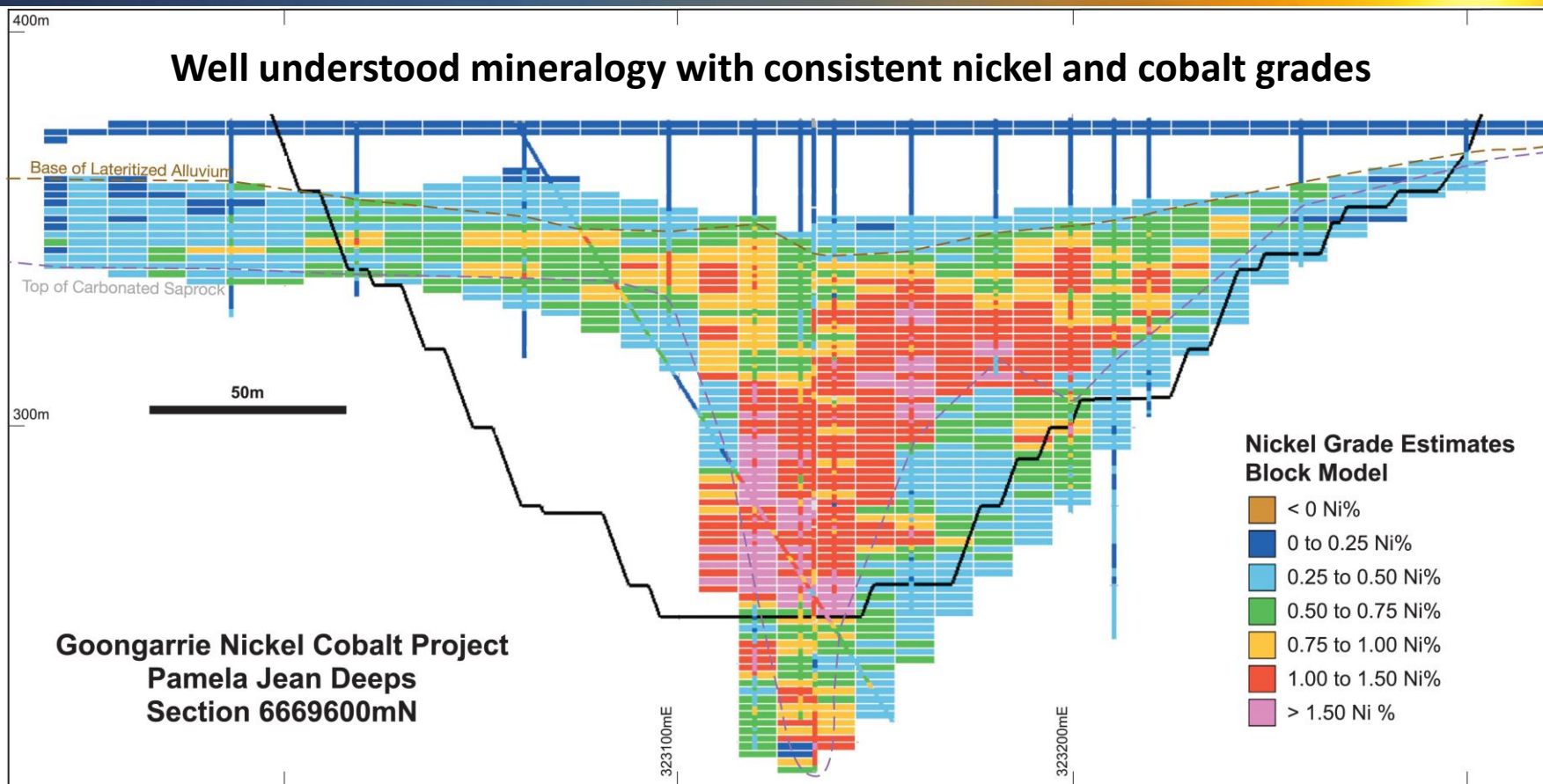
The information shown on this slide has been previously released on the ASX platform by Ardea in ASX releases, "Goongarrie Nickel Cobalt Project, PFS study, 28 March 2018 & +Goongarrie Expansion Study, 24 July 2018. All the material assumptions underpinning the forecast financial information derived from a production target, in the initial public report referred to in rule 5.17 continue to apply and have not materially changed.



# Thick, high-grade, single ore type, low strip ratio

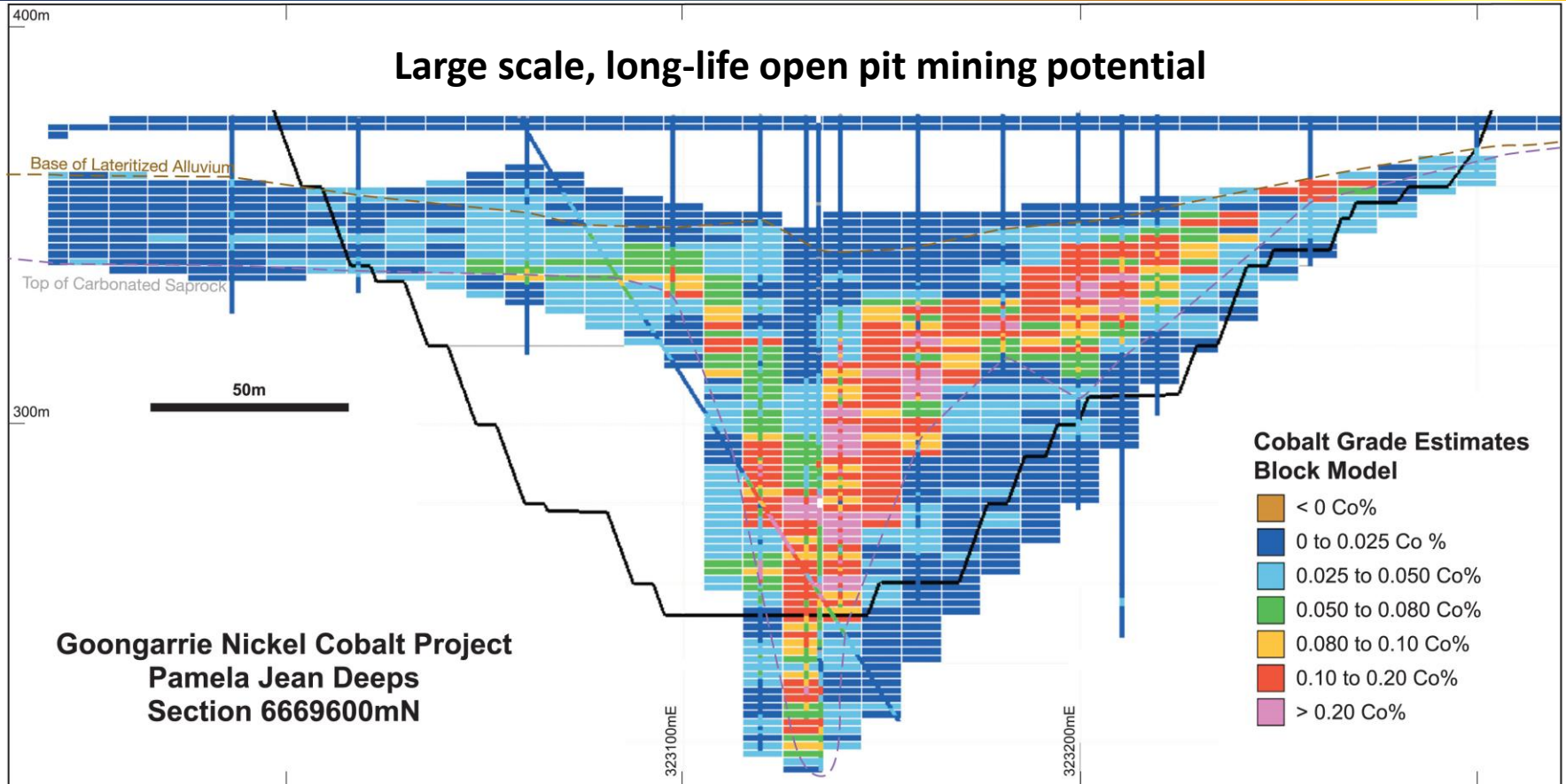


# Nickel Block Model – Cross Section 6669600mN





# Cobalt Block Model – Cross Section 6669600mN





# GNCP Material Source, Type and Quality



## **The high quality of Goongarrie ore is the key to project success:**

- High levels of nickel and cobalt with scandium credit potential
- Ore mainly goethitic (>40% Fe), no smectite clays (unlike many other laterite deposits, so no drying required before ore processed)
- Highly soluble in PAL, low acid consumption, excellent rheology, pulp density (expected lower Capex and Opex compared to peers)
- No screen upgrade required, eliminates ore preparation risk (commonly a stumbling block for non-goethitic deposits)
- Ni-Co mineralised neutralizer recovered during mining provides a cost-effective alternative to importing limestone

# Significant Progress since Ardea listed in 2017

## Geology

- ✓ **Resource upgrade** at Goongarrie
- ✓ **Maiden reserve** announced for Goongarrie
- ✓ **50,561m of drilling** to date by Ardea since listing
- ✓ Comprehensive geomet studies completed and underway

## Metallurgy

- ✓ **Variability** and **Rheology** test work to date favourable
- ✓ **Pilot Plant** successfully produced **nickel and cobalt sulphate crystals**
- ✓ Crystals meet **specifications** of several **battery industry off-takers**
- ✓ **Marketing samples** being evaluated by off-takers and battery end-users

## Project Studies

- ✓ **Pre-Feasibility Study** completed for **1.0 and 1.5Mtpa** processing options
- ✓ **Expansion Case** (Scoping Study) completed for **2.25Mtpa** option
- ✓ Definitive Feasibility Study programs underway



*Nickel sulphate (l) and cobalt sulphate (r)  
produced from Goongarrie.*

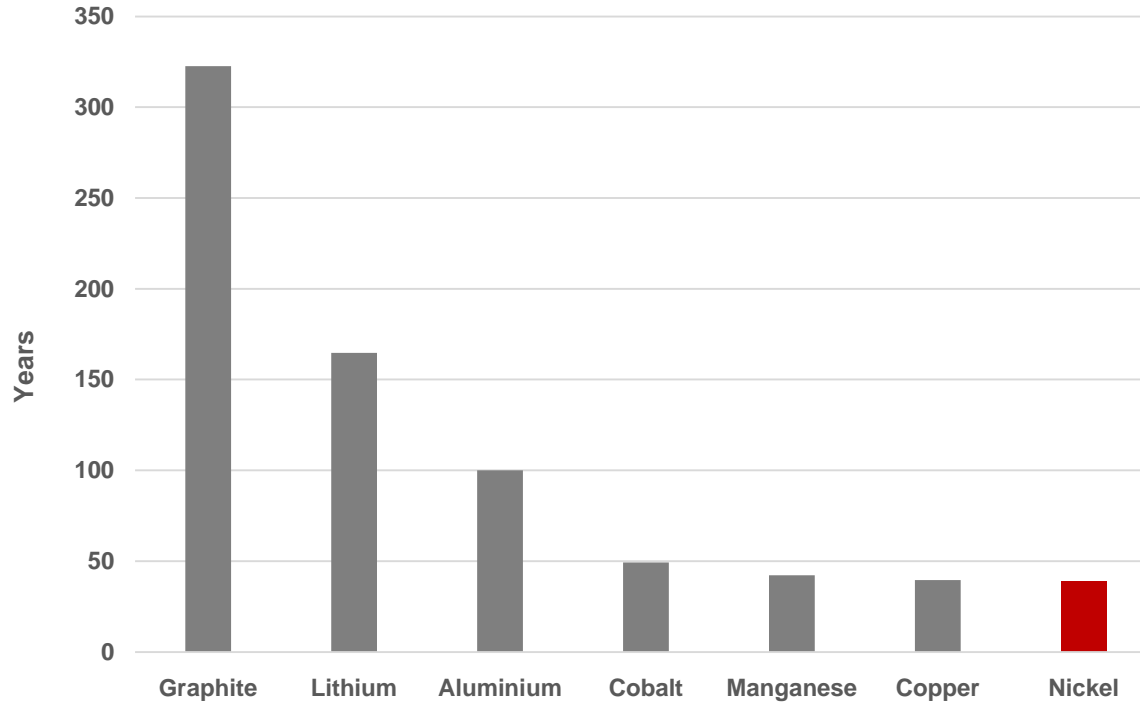
# World-Class Mining Standards, Location & Infrastructure



*View of Hannan St, Kalgoorlie, looking west, City of Kalgoorlie-Boulder*

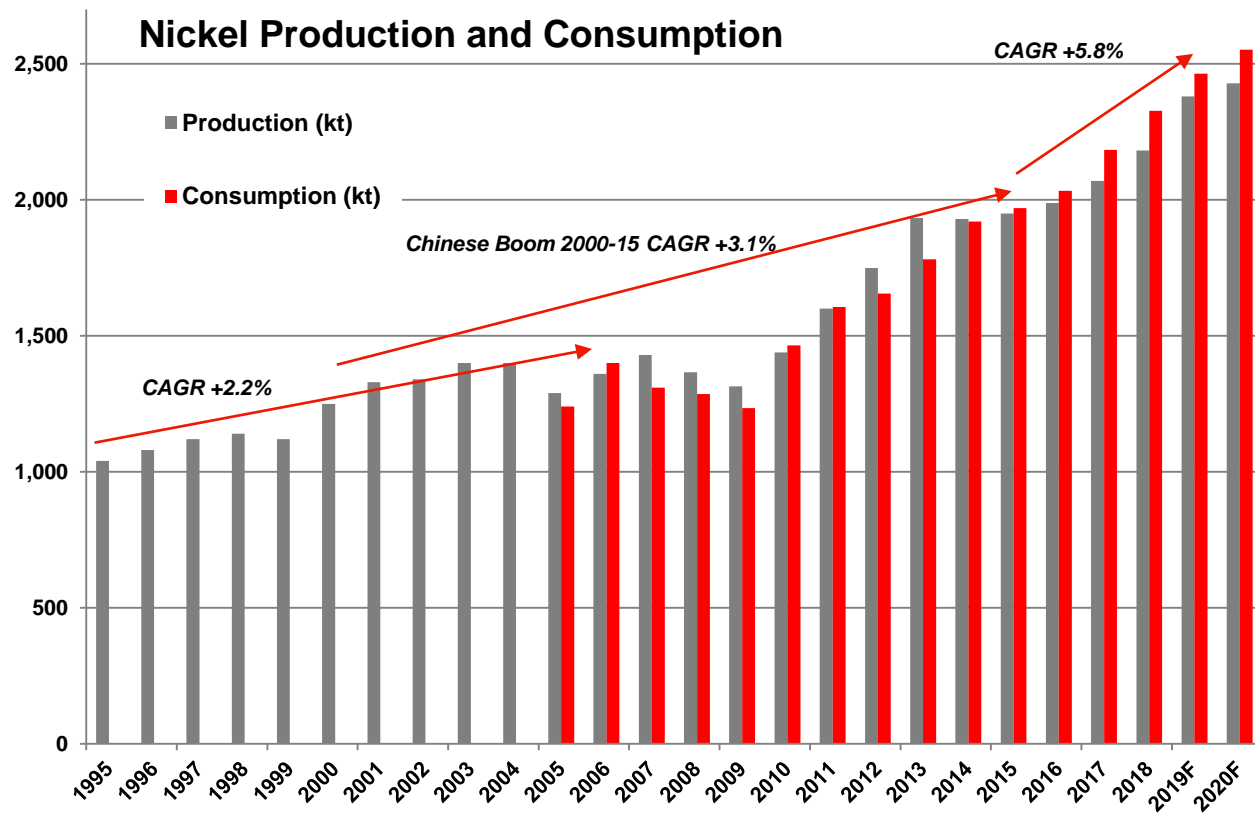
- Kalgoorlie, Western Australia offers **world-class infrastructure in an established mining district**
  - Over 125 years of mining in the region
  - Nil sovereign risk, very strong Local Government support
  - Goongarrie is 80 km north on the main Goldfields Highway
  - Railway line, power line, optic fibre cross Goongarrie tenements, mobile phone coverage
  - Gas pipeline adjacent to east
  - Rail access to ports of Kwinana and Esperance
- Western Australia's **safety, health and environmental standards are world's best practice**
- An **Australian source for battery metals** removes supply line concerns
- **Goongarrie offers an ethical, secure, long-life source of nickel and cobalt**

# The Nickel Market – Reserve Life of Major Battery Minerals



- High levels of most battery minerals but not nickel
- No shortage of graphite or lithium
- Nickel supplies most critical
- Declining nickel reserves
- Growing nickel demand expected to result in rising prices

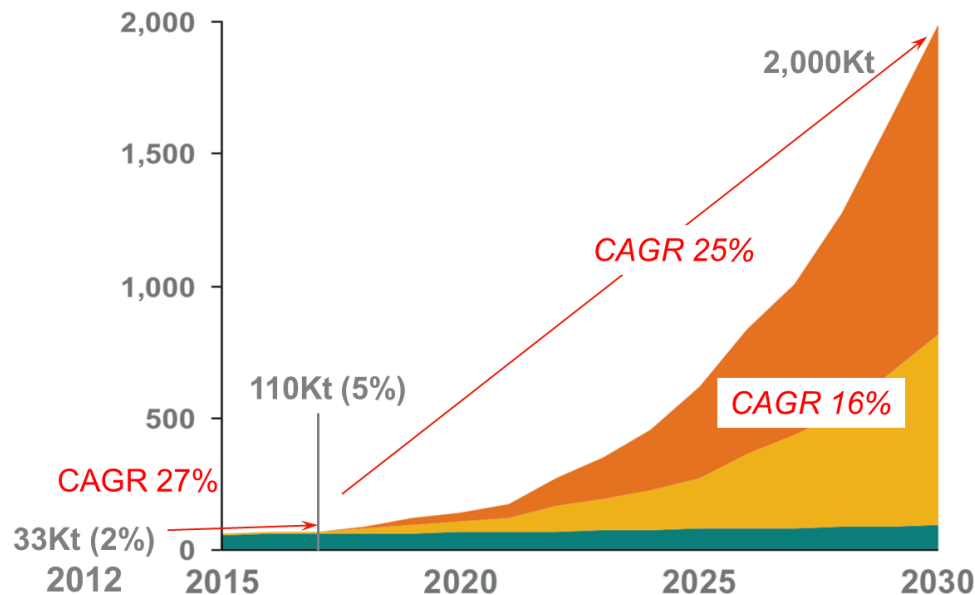
# Nickel Market Growth



- Production and consumption growth have been increasing
- During the Chinese economic boom, 2000-2015, GDP growth between 10 and 30% per annum (pa) initiated the acceleration
- Growth has been accelerating even faster over last five years
- Market size doubled between 1995 and 2016, i.e. ~20 years, to add 1 million tonnes.
- Currently adding ~0.5Mt in 5 years in a depressed market!
- **Future production not expected to keep up with growing demand, driven mainly by the battery sector**

# Projected Nickel Demand from Energy Revolution

- Nickel in non-EV batteries
- Nickel in EV's conservative scenario
- Nickel in EV's upside considering "market news"



- Current nickel market size ~2.5 million tonnes pa
- Depending on the scenario for the EV/SSB rate of adoption, nickel volumes to meet additional demand vary between 750,000 tonnes and 2 million tonnes pa
- Nickel demand from EV/SSB is expected to far exceed nickel production from existing operations in any scenario of EV/SSB adoption**





# Ardea Resources Limited

## Investment Summary

**Battery minerals for the EV and Battery revolution**  
**Gold and base metals in Australia's best locations**



**Ardea**

*Drill samples from Black Range west of the Goongarrie Nickel Cobalt Project. Black Range contains high nickel, and cobalt, and accessory scandium, platinum and palladium.*



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## EXPLORING

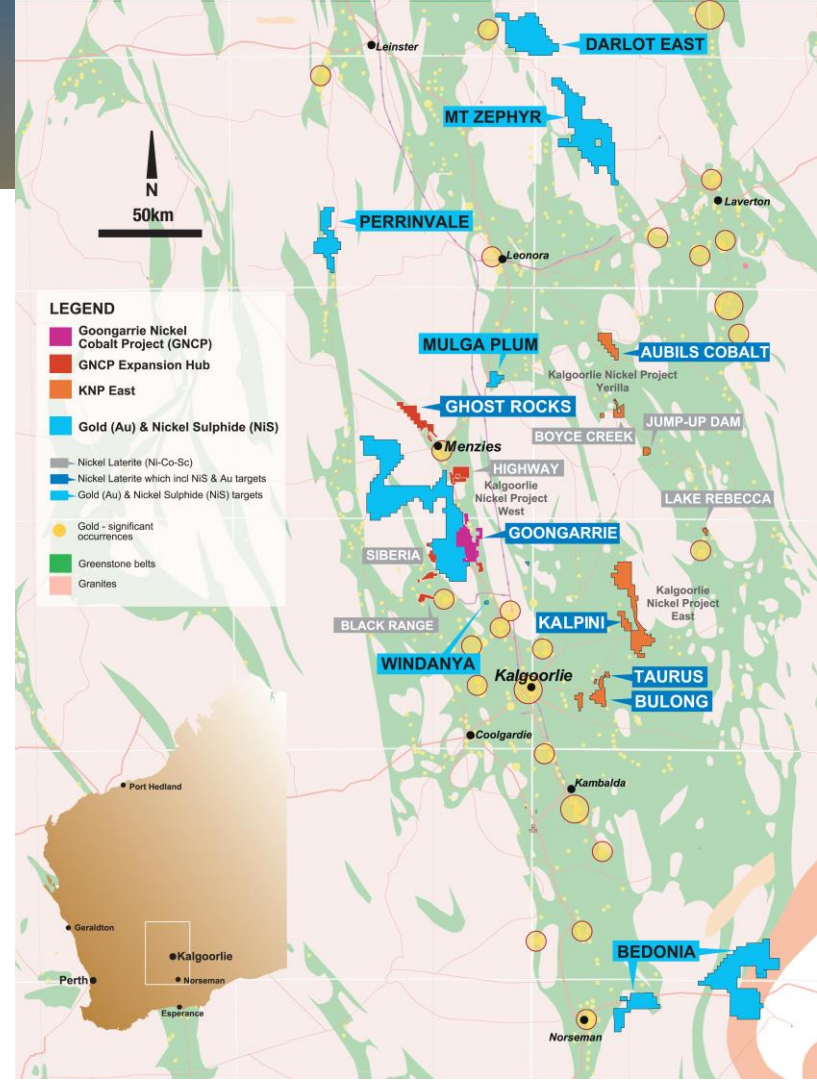
for Western Australian Gold and Nickel Sulphides

Exceptional greenfields opportunities in overlooked areas of the Eastern Goldfields

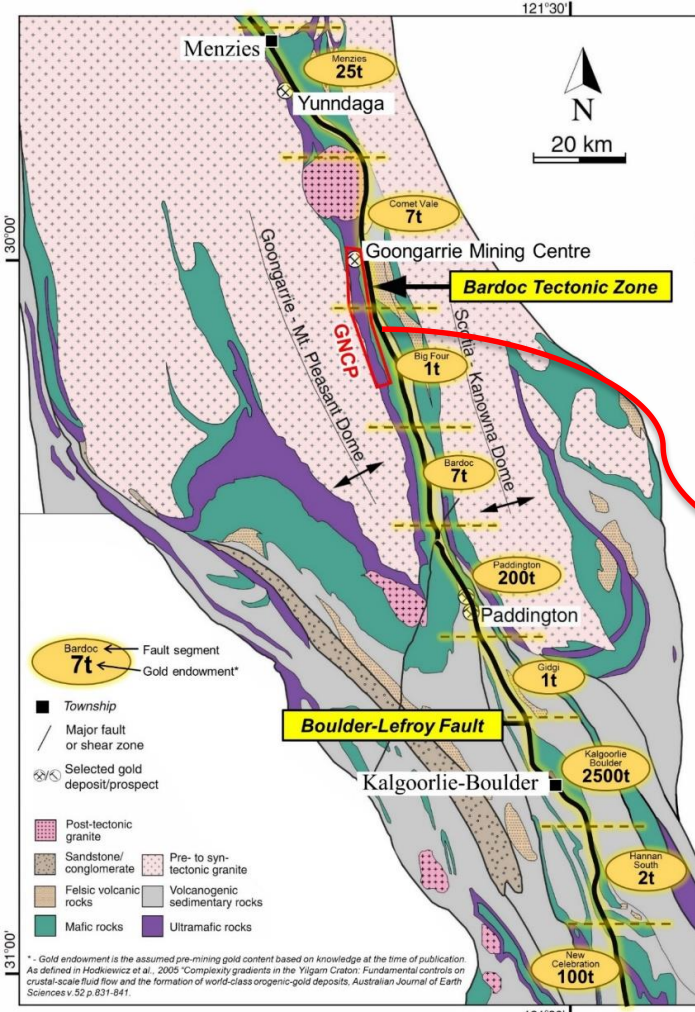


# 2019 Exploration Program

- ✓ 3,500km<sup>2</sup> of 100% controlled tenure in one of Australia's premier gold and nickel sulphide provinces
- ✓ Drilling recently completed at Bardoc Tectonic Zone (BTZ) confirms gold mineralisation potential with multiple targets
- ✓ Drilling confirms gold mineralisation at Gale and nickel sulphide gossan at Jones A, within the Mt Zephyr project
- ✓ Gold exploration programs active on Taurus, Bedonia, Ghost Rocks, Mulga Plum and Windanya (on the BTZ)
- ✓ Perrinvale nickel (-copper-PGE) sulphide EM survey planned
- ✓ Bedonia, Emu Lake, Highway and Ghost Rocks nickel (-copper-PGE) sulphide projects being assessed
- ✓ Extensive tenure position provides multiple strategic options
- ✓ Considering JV on Mt Zephyr and Darlot East







# Bardoc Tectonic Zone (BTZ)

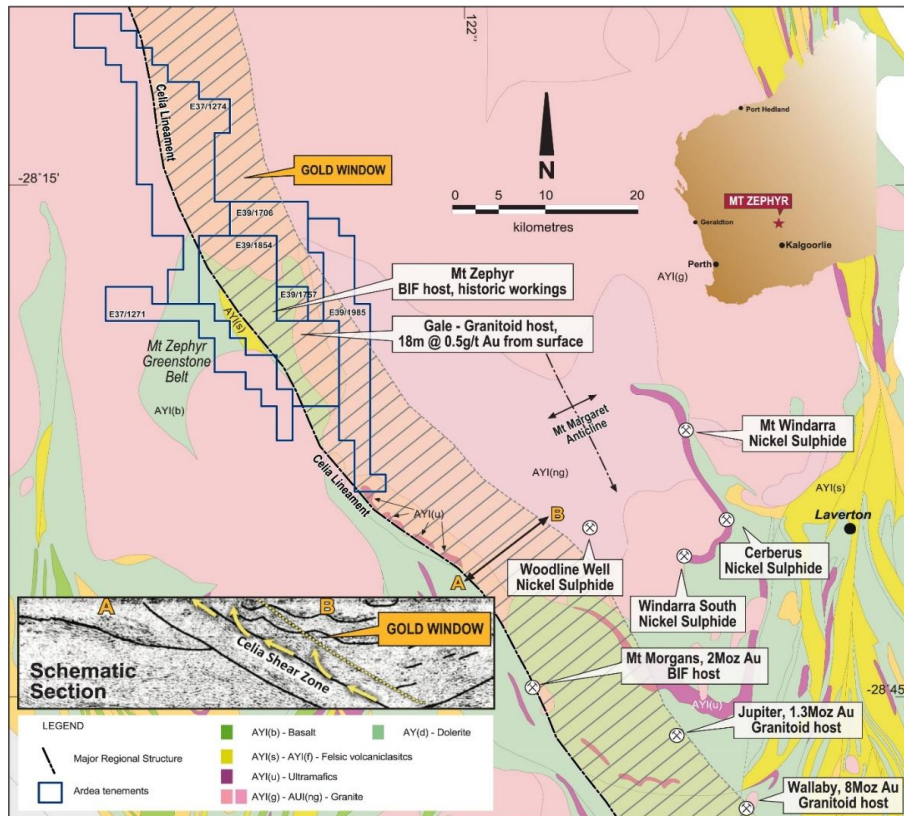
- ✓ One of the major gold-bearing structures of the Eastern Goldfields runs through the GNCP
- ✓ 80 km long gold-producing regional shear / fault system
- ✓ Hosts **Paddington** gold mine, **Goongarrie**, **Menzie's**, and **Comet Vale** historic gold mining centres
- ✓ Contiguous with Boulder-Lefroy Fault, hosts **Kalgoorlie**, **St Ives** mining centres.

## Laterite cover has obscured the BTZ's true potential at Goongarrie

- ✓ Program of exploration drilling tied in with GNCP site layout sterilisation drilling
- ✓ First phase sterilisation drilling completed and multiple gold targets defined with further work planned
- ✓ Future drilling must penetrate laterite to fresh rock to test for gold
- ✓ Project data being refined to optimally drill gold targets in the future



# Mount Zephyr Drilling at Gale Prospect identifies large scale gold system

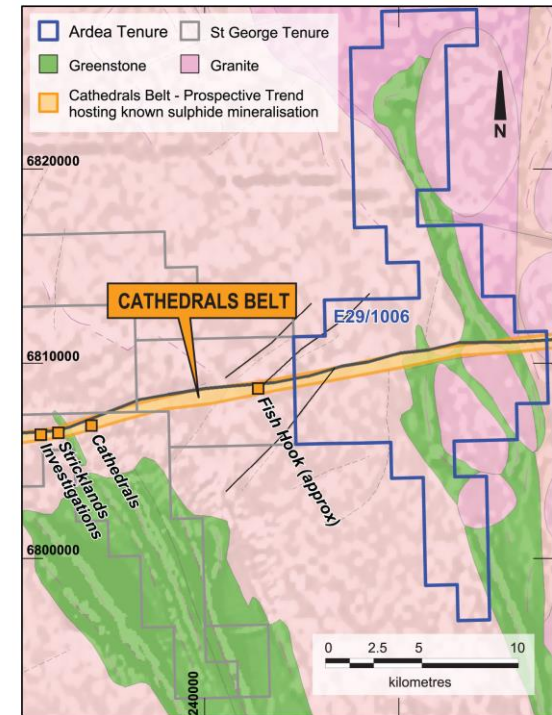


- Granitoid hosted gold mineralisation from surface\*
- On Celia Shear Zone along strike from geologically similar Jupiter and Wallaby gold mines
- Mt Zephyr has the scope, scale, and potential to be home to the next significant discovery of WA's Eastern Goldfields. It includes:
  - Orogenic gold mineralisation at new prospects and historic mining centres
  - Nickel-copper(-PGE) sulphides in Mt Windarra stratigraphic equivalents
- For Ardea whose focus is on the GNCP, the work required exceeds the capabilities of a focused junior.
- The best opportunity for discovery is through sale, farmout, or joint venture.
- Contact Ardea to receive the Information Memorandum.

\*ASX Release: Drilling at Gale identifies large scale gold system (11 April 2019)

# Perrinvale Nickel Sulphide Project

- The **Cathedrals Belt**, Australia's newest nickel province, is a geologically unusual E-W belt.
- Ardea has the eastern strike extent of the host structure of St George Mining's recent Mt Alexander Ni-Cu(-PGE) sulphide discoveries.
- St George Mining notes that\*:
  - they have **42 untested conductors** within their tenure
  - **all EM anomalies tested to date contain Ni-Cu sulphides**
  - drill programs are to commence shortly
- **Ardea to commence EM programs** along strike to generate targets
  - Drill testing to follow



Massive Ni-Cu sulphides, Investigators prospect, drill hole MAD60, 5.3m @ 4.95% Ni, 2.75% Cu, 0.16% Co, & 5.25g/t PGE from 159.38m (St George Mining Ltd)\*

\* Source: St George Mining publicity document, 9 July 2019, "42 EM conductors ready to drill at Mt Alexander nickel-copper sulphide project". St George Mining Limited has not consented to the use of this report reference nor its contents.

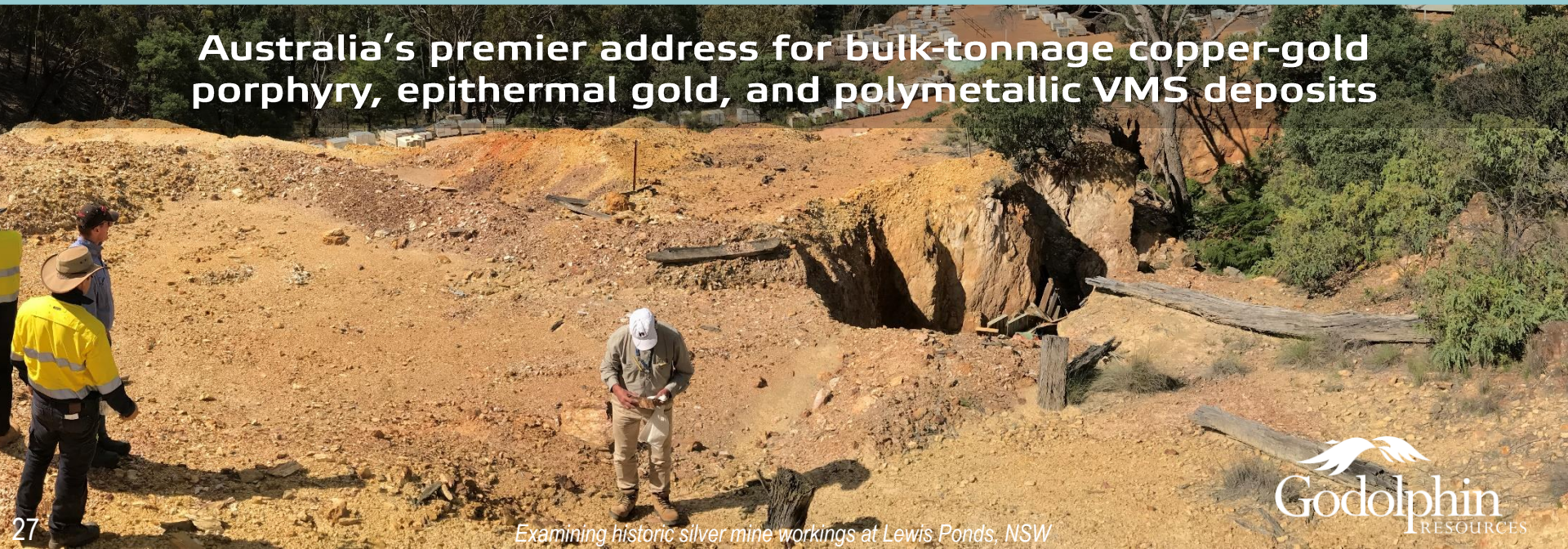


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## DIVESTING

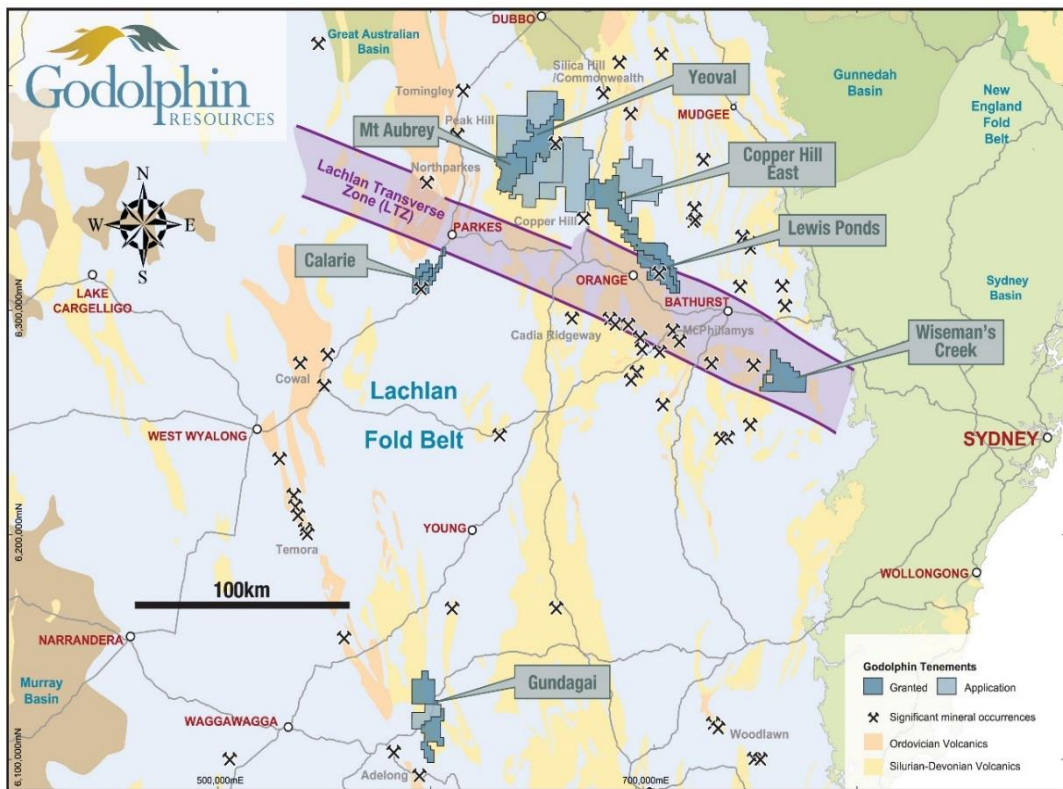
our New South Wales Gold and Base Metal Projects

**Australia's premier address for bulk-tonnage copper-gold porphyry, epithermal gold, and polymetallic VMS deposits**





# Spinning out the NSW assets

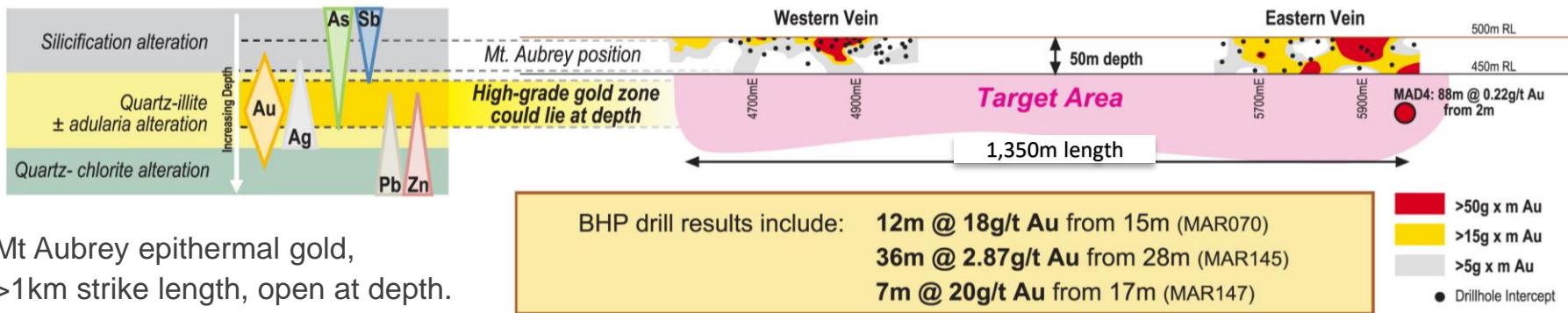


**3,216km<sup>2</sup> of 100% ARL controlled, highly-prospective tenure within Lachlan Fold Belt, NSW**

- Resource upgrade underway at **Lewis Ponds** (polymetallic Zn-Ag-Pb-Au-Cu VMS deposit)
- Data reviews completed and strategy defined for all projects
- First phase mapping and auger geochemical sampling undertaken with a focus on **Mt Aubrey**, (high-grade Au-Ag epithermal), **Yeoval & Copper Hill East** (porphyry systems) and **Gundagai** (orogenic gold). All results positive.
- **Godolphin IPO timeline:**
  - prospectus expected to be issued in Q3 2019
  - Aiming to list within the next 6 months

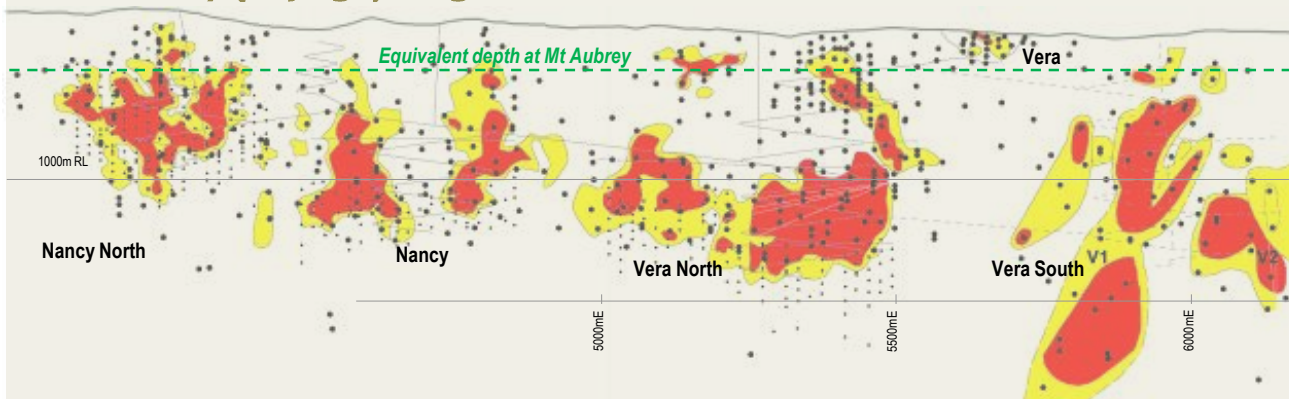
# Mt Aubrey – former BHP epithermal gold mine

## Mt Aubrey long section looking northeast



- Mt Aubrey epithermal gold, >1km strike length, open at depth.
- Mined by BHP Gold in 1990-91
  - 3 backfilled open pits
  - +10g/t Au ore left in pit floor
  - 1991 gold price US\$350 oz, now >US\$1,400 oz.
- Comparable to upper levels of Vera-Nancy mine (Pajingo)

## Vera-Nancy (Pajingo) long section – same scale



# Lewis Ponds – Zinc, Gold, Silver

Extensive mining history from 1850s through to early 1900s

**JORC Inferred Resource:** 6.62Mt at 2.4% Zn, 1.4% Pb, 0.2% Cu,  
1.5g/t Au and 69g/t Ag

**Exploration Target<sup>^</sup>:** 15–25 Mt at 2.2–3.7% ZnEq\* or 1.2–2.0 g/t AuEq\*

The potential quantity and grade is conceptual in nature, there has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

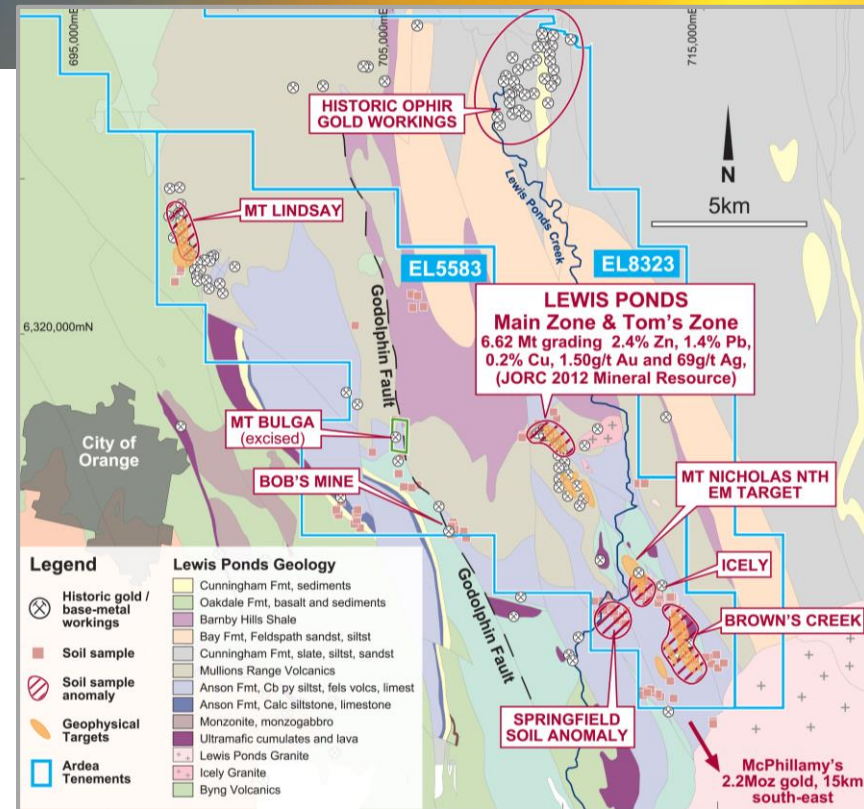
- Resource Upgrade underway
- Soil Au anomalies + McPhillamy-style Au targets – not yet tested
- **Premium exploration potential**, 50km strike Godolphin Fault from McPhillamys in south to Copper Hill East in north

**Two concentrates produced from first-pass met test work:**

- Clean zinc concentrate - over **66 % contained Zn**
- Cu-Pb-Ag-Au concentrate containing **1,619 g/t Ag, 17.6 g/t Au, 4.78 % Cu, and 30.3 % Pb**
- Excellent recovery of payable metals and fast flotation kinetics

<sup>^</sup>Exploration Target sourced from page 10 of Heron Resources ASX Release, Ardea Resources Limited Project Update, 6 January 2017. The Exploration Target in this report is based on information originally compiled and validated by Mr Ian Buchhorn in 2017 who is a member of the Australasian Institute of Mining and Metallurgy. Mr Buchhorn is a full time employee and shareholder of Ardea Resources Limited and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity that he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Buchhorn consents to the inclusion in this report of the matters based on his information in the form and context that it appears.

\*21/12/2016 US\$ price, recovery: Zn (\$2617/t, 100%), Au (\$1133/oz, 90%), Ag (\$16.00, 80%), Pb (\$2259/t, 80%), Cu (\$5488.5/t, 80%). Zn equiv. = Zn(%) + 1.253Au(g/t) + 0.016Ag(g/t) + 0.665Pb(%) + 1.678Cu(%). Au equiv. = 0.575Zn(%) + Au(g/t) + 0.016Ag(g/t) + 0.478Pb(%) + 1.205Cu(%)



# Investment Summary

- **Goongarrie** is clearly **Australia's premier nickel-cobalt project**
- Globally significant mineral resource in an **infrastructure rich and stable jurisdiction** provides ability to increase production from multiple processing hubs within the KNP
- Up to **100% off-take is available**, subject to financing support from Strategic Partner
- Leveraged to increasing nickel and cobalt demand from the rapidly growing Electric Vehicle and Static Storage Battery markets
- Ardea has an extensive (3,500km<sup>2</sup>), highly prospective landholding in the goldfields of WA with active work programs for gold and nickel sulphides
- Strategic portfolio of NSW gold and base metal assets leading into Godolphin IPO







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for Western Australian  
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# APPENDICES

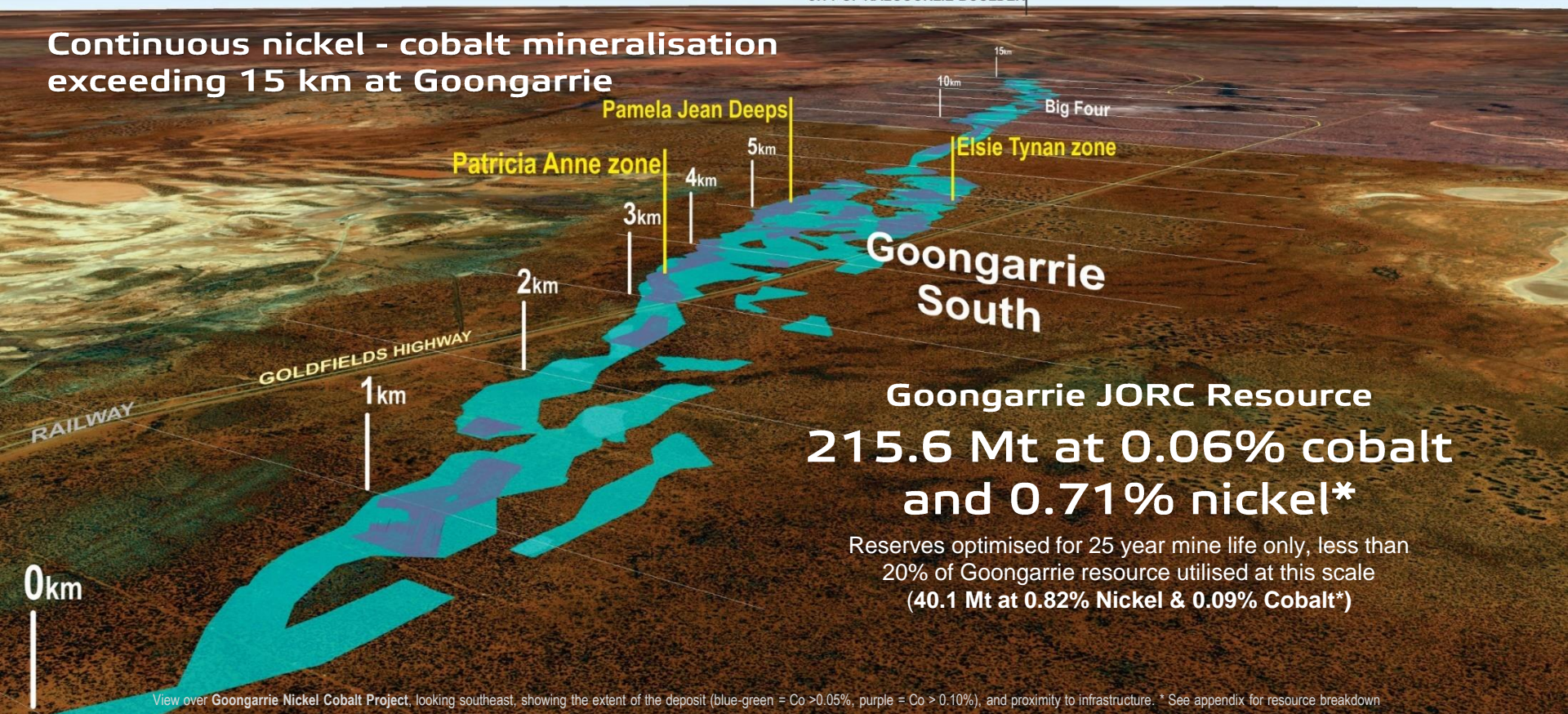
For further information regarding Ardea, please visit [www.ardearesources.com.au](http://www.ardearesources.com.au)



# Our Flagship Goongarrie Nickel - Cobalt Project

CITY OF KALGOORLIE-BOULDER

Continuous nickel - cobalt mineralisation  
exceeding 15 km at Goongarrie



Goongarrie JORC Resource  
**215.6 Mt at 0.06% cobalt  
and 0.71% nickel\***

Reserves optimised for 25 year mine life only, less than  
20% of Goongarrie resource utilised at this scale  
(40.1 Mt at 0.82% Nickel & 0.09% Cobalt\*)

View over Goongarrie Nickel Cobalt Project, looking southeast, showing the extent of the deposit (blue-green = Co >0.05%, purple = Co > 0.10%), and proximity to infrastructure. \* See appendix for resource breakdown

# APPENDIX – Goongarrie Nickel Cobalt Project Resources

*Summary of total mineral resources within the Goongarrie Nickel Cobalt Project area, comprising resources at Goongarrie Hill, Goongarrie South, Big Four, and Scotia Dam (14 March 2018).*

Camp	Domains	Cut-off %	Resource category	Size (Mt)	Cobalt (%)	Nickel (%)	Contained metal	
							Co (t)	Ni (t)
Goongarrie Hill	Ni & Co	≥ 0.5% Ni or > 0.08% Co	Inferred	52.5	0.04	0.65	21,600	340,400
			Subtotal	52.5	0.04	0.65	21,600	340,400
Goongarrie South	Ni & Co	≥ 0.5%Ni or > 0.08% Co	Measured	10.3	0.10	0.98	10,200	101,200
			Indicated	56.2	0.07	0.72	37,200	407,000
			Inferred	32.2	0.06	0.69	20,300	221,200
			Subtotal	98.7	0.07	0.74	67,700	729,300
Big Four	Ni & Co	≥ 0.5%Ni or > 0.08% Co	Indicated	45.5	0.06	0.71	28,200	320,700
			Inferred	9.9	0.06	0.63	6,100	61,900
			Subtotal	55.4	0.06	0.69	34,300	382,700
Scotia Dam	Ni & Co	≥ 0.5% Ni or > 0.08% Co	Indicated	3.3	0.09	0.81	3,000	26,900
			Inferred	5.7	0.07	0.76	4,100	43,300
			Subtotal	9.0	0.08	0.78	7,100	70,200
Total	All	≥ 0.5% Ni or > 0.08% Co	Measured	10.3	0.10	0.98	10,200	101,200
			Indicated	105.0	0.07	0.72	68,400	754,600
			Inferred	100.3	0.05	0.67	52,100	666,900
Goongarrie Resource Global			TOTAL	215.6	0.06	0.71	130,700	1,522,700

Note: All nickel and cobalt domains are included, and are encapsulated by an envelope defined by nickel grades equal to or greater than 0.5%. Note that figures are rounded to reflect degree of certainty and may not tally.



# APPENDIX – Reserves Defined for Goongarrie Nickel Cobalt Project

*Goongarrie Nickel Cobalt Project, Ore Reserves based on 25 year mine life at 1.5 Mtpa.*

Deposits	Class	Size (Mt)	Cobalt (%)	Nickel (%)
<b>Goongarrie South</b>	Proven	8.95	0.10%	0.96%
	Probable	17.26	0.09%	0.79%
	<b>Total</b>	<b>26.22</b>	<b>0.10%</b>	<b>0.85%</b>
<b>Big Four</b>	Proven	—	—	—
	Probable	13.92	0.09%	0.77%
	<b>Total</b>	<b>13.92</b>	<b>0.09%</b>	<b>0.77%</b>
<b>TOTAL</b>	<b>Proven</b>	<b>8.95</b>	<b>0.10%</b>	<b>0.96%</b>
	<b>Probable</b>	<b>31.18</b>	<b>0.09%</b>	<b>0.78%</b>
	<b>Total</b>	<b>40.13</b>	<b>0.09%</b>	<b>0.82%</b>

Using a nickel equivalent cut of >0.81 %, which used inputs of A\$18,900/t nickel and A\$120,750/t cobalt. (US\$15,120/t Ni and US\$96,600/t Co, 0.8 exchange rate). Nickel equivalent (Nieq %) =  $Ni\ grade + \frac{Co\ grade \times Co\ price}{Ni\ price}$ . Prices used are US\$15,120/t for nickel and US\$96,600/t for cobalt. No assumption about recovery is included here. Recoveries are addressed elsewhere throughout the mining schedule and financial model.

The information shown on this slide has been previously released on the ASX platform by Ardea in ASX release, Goongarrie Nickel Cobalt Project, PFS study, 28 March 2018. The information in this report that relates to Ore Reserves for the Goongarrie South and Big deposits of the Goongarrie Nickel Cobalt Project is based on information compiled by Mr Steve Lampron who is a Member of the Australasian Institute of Mining and Metallurgy and who has provided expert guidance on mine planning and Ore Reserve estimation. Mr Lampron is a director of Auralia Mining Consulting and has sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Lampron consents to the inclusion in the report of the matters based on this information in the form and context in which it appears.





# APPENDIX – KNP Resource Breakdown

## KNP nickel-cobalt mineral resource (JORC 2012), Ardea Annual Report 2017

Resource Category	Quantity (Mt)	Cobalt (%)	Nickel (%)	Contained cobalt (t)	Contained nickel (t)
Measured	9.6	0.10	1.02	9,700	98,800
Indicated	232.9	0.06	0.75	141,200	1,759,700
Inferred	530.5	0.05	0.68	254,400	3,600,000
<b>KNP Total Resources</b>	<b>773.0</b>	<b>0.05</b>	<b>0.70</b>	<b>405,400</b>	<b>5,458,400</b>

In accordance with the Australian Securities Exchange Limited Listing Rules Appendix 5A:

The information in this report that relates to Mineral Resources for the Highway, Goongarrie Hill, Goongarrie South, Big Four, Aubils and Boyce Creek Prospects is based on information originally compiled in-house and validated by Steve Jones in 2013. Steve Jones is a member of the Australasian Institute of Mining and Metallurgy. Steve Jones is a full time employee of Heron Resources Limited and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the resource estimation activity that he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Steve Jones consents to the inclusion in this report of the matters based on his information in the form and context that it appears. Note that Mineral Resources that are not Ore Reserves do not have demonstrated viability.

The information in this report that relates to Mineral Resources for the Siberia North, Bulong East, Siberia, Black Range, Taurus and Jump Up Dam Prospects is based on information compiled by Snowden Mining Industry Consultants by members of the Australian Institute of Mining and Metallurgy. Snowden Mining Industry Consultants had sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the resource estimation activity. All resources were internally audited by Snowden and signed off by a person of sufficient experience to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Steve Jones has validated the original resource estimates during 2013. Steve Jones consents to the inclusion in this report of the matters based on his information in the form and context that it appears. Note that Mineral Resources that are not Ore Reserves do not have demonstrated viability.



# APPENDIX – The Sulphate Markets

- Strong growth in sulphate pricing is expected with rapidly increasing demand for high-purity product from manufacturers globally. Increased battery production is required to power the Automotive Electrification Revolution
- Cobalt sulphate and nickel sulphate attract a price premium (based on contained metal)
  - Cobalt sulphate – 5% premium**
  - Nickel sulphate – 30% premium**
- East Asia is the major consumer, manufacturing most of the world's lithium ion batteries – ongoing discussions with a number of interested parties from this region.
- Sulphate market is strong with spot prices increasing substantially since PFS release

		Price date	Units	CNY / t	USD / t	USD / lb
<b>Cobalt sulphate</b> (contains 20.97% cobalt)	PFS	Feb 2018 (avg)	Sulphate	<b>¥121,600</b>	\$19,241	\$8.73
			Contained metal equiv.		<b>\$91,771</b>	<b>\$41.63</b>
	Spot	4 Apr 2018	Sulphate	¥142,000	\$22,469	\$10.19
			Contained metal equiv.		\$107,167	\$48.61
<b>Nickel sulphate</b> (contains 22.33% nickel)	PFS	Feb 2018 (avg)	Sulphate	<b>¥27,500</b>	\$4,351	\$1.97
			Contained metal equiv.		<b>\$19,486</b>	<b>\$8.84</b>
	Spot	4 Apr 2018	Sulphate	¥28,500	\$4,510	\$2.05
			Contained metal equiv.		\$21,509	\$9.76

All pricing data sourced from SMM (Shanghai Metals Markets – metals.com)  
CNY USD exchange rate USD:CNY \$1.00 equals ¥6.32

