



**Ardea**  
Resources Limited

# Kalgoorlie Nickel Project – Goongarrie Hub

*A multi-decade, large scale,  
low cost nickel-cobalt operation*

Andrew Penkethman  
Managing Director & CEO

RIU Explorers Conference  
Presentation  
February 2025



# 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 Ardea Resources Limited (Ardea or the Company) prospectus dated 9 November 2016 (including supplementary prospectuses dated 18 November 2016 and 6 January 2017), High-grade nickel-cobalt mineralization extended at Goongarrie (8 October, 2018), Goongarrie Pilot Plant trial produces battery grade crystals (31 October 2018), Emu Lake Discovery (3 December 2021, 14 January 2022, 7 February 2022), Goongarrie Hub Feasibility Study Update (25 January 2022), High-grade Nickel-Cobalt Confirmed at Kalpini with Scandium and Rare Earth Elements (14 March 2022), Kalgoorlie Nickel Project Recognition on All Tiers of Australian Government (21 March 2022), Confirmation of High-Grade Nickel-Cobalt from Goongarrie South Metallurgical Drilling (16 May 2022), Kalgoorlie Nickel Project: Metallurgical Update – Mineralised Neutraliser (16 November 2022), Ardea Completes KNP ESG Accreditation from Independent Leading Global Platform (24 November 2022), Nickel sulphide anomalism from aircore drilling at Kalpini Project (2 May 2023), Mineralised Neutraliser Global Patent Lodged (15 June 2023), Kalgoorlie Nickel Project Mineral Resource Estimate Exceeds 6 Million Tonne Contained Nickel (30 June 2023), KNP Goongarrie Hub Ore Reserve and Feasibility Study Defines +40 Year Operation with Strong Financial Metrics (5 July 2023), Ardea Kalgoorlie Nickel Project – MOU with Sumitomo Metal Mining, Mitsubishi Corporation, and Mitsui & Co., Ltd (5 July 2023), Kalgoorlie Nickel Project Goongarrie Hub Tenement Consolidation (17 July 2023), Ardea Quarterly Activities Report June 2023 (27 July 2023), Ardea Annual Report 2023 (27 September 2023), Ardea and Japanese Consortium Update on MOU (29 September 2023), Nickel Sulphide Prospectivity Confirmed and Lithium-Caesium-Rubidium bearing intrusives in Highway EIS drillhole (15 December 2023), Ardea and Japanese Consortium: Update on Progress on KNP - Goongarrie Hub (21 December 2023), Ardea Quarterly Activities Report December 2023 (31 January 2024), Ardea and Japanese Consortium: Update on Progress on KNP - Goongarrie Hub (29 February 2024), Ardea and Japanese Consortium: Update on Progress on KNP - Goongarrie Hub (27 March 2024), Ardea Quarterly Activities Report March 2024 (26 April 2024), ARL SMM and MC to form a JV to develop KNP Goongarrie Hub ASX Announcement (29 April 2024), Ardea Completes Updated Kalgoorlie Nickel Project ESG Accreditation From Independent Leading Global Platform (9 May 2024), Ardea receives \$1.1 million R&D Rebate (13 June 2024), Kalgoorlie Nickel Project - Goongarrie Hub DFS Drilling Underway (4 July 2024), Kalgoorlie Nickel Project - Goongarrie Hub DFS Underway (8 July 2024), Ardea Quarterly Activities Report June 2024 (30 July 2024), KNP – Goongarrie Hub Joint Venture FIRB Approval Received (14 August 2024), KNP – Goongarrie Hub Joint Venture Transaction Completion with Japanese Consortium (30 August 2024), Ardea Annual Report 2024 (13 September 2024), Kalgoorlie Nickel Project – Goongarrie Hub DFS Progress Update (17 January 2025) and Ardea Quarterly Activities Report December 2024 (28 January 2025) and KNP Goongarrie Hub DFS Update (11 February 2025).

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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, 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.



**Experienced Board & management, respected Partners,  
supportive Shareholders, tight capital structure**

**199,682,915**

Shares on Issue

3,513,400 Performance Rights.  
3,000,000 Options

Top 40 Shareholders

**~60% equity**

Board & Management

**~10% equity**

Cash

**\$13.2M**

**No Debt**

31 Dec 2024 <sup>1</sup>

Market Cap

**\$87.9M**

\$0.44 Share Price  
17 February 2025

Consortium fully  
funding DFS

**\$98.5M**

To earn 35% interest in KNP  
Goongarrie Hub, and can  
increase to 50% on  
successful FID<sup>1</sup>

**\$78.8M**

remaining to be  
expended by  
Consortium in DFS  
Funding

31 Dec 2024 <sup>1</sup>



**Mat Longworth** Non-Executive Chair

*Experienced across exploration, project evaluation / development including KNP and corporate management*



**Andrew Penkethman** MD & CEO

*Experienced geologist with strong technical and corporate focus including discovery and strategic partner success. ASX, TSX and AIM experience*



**Maree Arnason** Non-Executive Director

*Highly experienced director and executive in the natural resources, energy and manufacturing sectors*



**Ian Buchhorn** Executive Director

*Mineral economist and geologist, with significant Eastern Goldfields of WA, exploration, evaluation, development and operations experience*



**Michael Rodriguez** Executive Director

*Metallurgist experienced in the design, construction, commissioning and operation of metallurgical operations including HPAL*



**Sam Middlemas** Company Secretary

*Chartered Accountant experienced in providing Company Secretary services*



**Rebecca Moylan** Chief Financial Officer

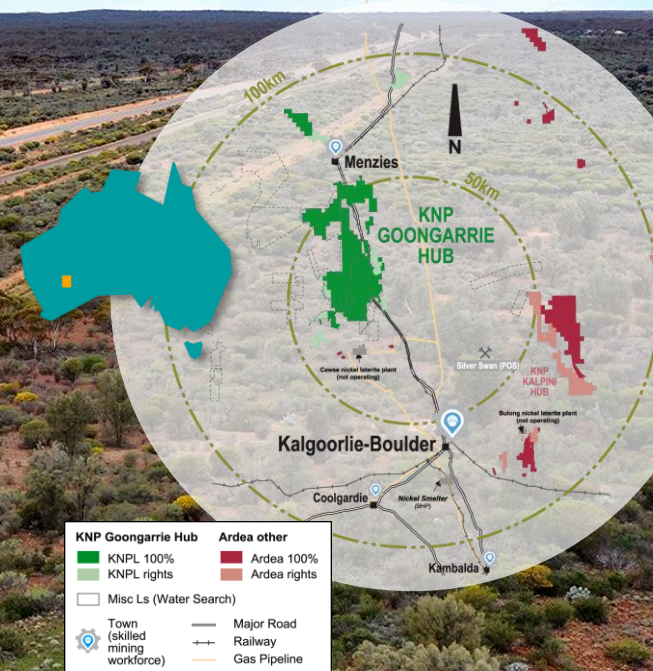
*Experienced CFO with expertise in financial and corporate management, accounting, project financing and contract negotiation*

1. See 30 August 2024 ASX release Kalgoorlie Nickel Project (KNP) Goongarrie Hub Joint Venture Transaction Completion with Japanese Consortium (consisting of Sumitomo Metal Mining (SMM) and Mitsubishi Corporation (MC)) DFS funds available \$89.9M see ARL Dec Qtr Report, 28 Jan 2025



# Operating in one of the best jurisdictions in the world

KNP Goongarrie Hub - access to excellent infrastructure, a skilled workforce and a stable regulatory framework



Goldfields Highway, rail line, fibre optics and power pass through the Project, with gas to the east. Two Port options which are well serviced by road & rail



# Large scale, strategic nickel-cobalt Mineral Resource

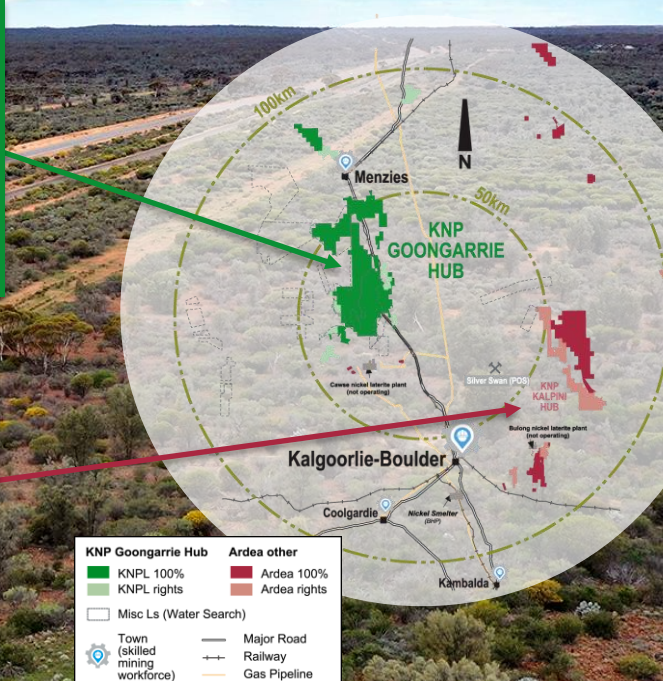
KNP nickel-Cobalt MRE<sup>1</sup> is the largest in Australia, making it nationally strategic and globally significant



**KNP Goongarrie Hub -**  
 584Mt at 0.69% Ni and 0.043%  
 Co for 4Mt of contained Ni  
 and 250kt of contained Co <sup>1</sup>  
 DFS fully funded by Partners <sup>2</sup>

**Rest of KNP – 100% ARL**  
 270Mt at 0.74% Ni and 0.05%  
 Co for 2Mt of contained Ni  
 and 136kt of contained Co <sup>1</sup>  
 Plus Ni Sulphide at Kalpini <sup>3</sup>

**KNP Goongarrie Hub to be a multi-decade operation**



1. See full Mineral Resource Estimate (MRE) tables in Appendix 2 of this presentation and 30 June 2023 ARL ASX Announcement. Also see GSWA rankings April 2024 Flyer  
 2. See 30 August 2024 ASX release KNP Goongarrie Hub Joint Venture Transaction Completion with Japanese Consortium  
 3. See 14 January 2022 ASX release Emu Lake Nickel Sulphide discovery confirmed with 2.72m at 5.42% Ni



# Working with Consortium to develop the Goongarrie Hub

Partnership validates KNP Goongarrie Hub's global significance as a desirable Critical Minerals source



<sup>^</sup> See 30 June 2023 ARL MRE announcement. Or see Appendix 2 in this presentation

\* See 30 August 2024 ASX release KNP Goongarrie Hub Joint Venture Transaction Completion with Japanese Consortium.

SMM and MC, together the Consortium, fully funding DFS up to A\$98.5M to earn 35% interest in KNPL, and a further 15% interest in KNPL on positive Final Investment Decision (FID). Consortium to assist KNPL in optimising debt financing





# KNP Goongarrie Hub – Strong global interest

KNPL and Ardea hosted a recent site visit for representatives from JOGMEC, METI and JC



Above: The KNPL team with Ardea's Andrew Penkethman and Michael Rodriguez and representatives from the Japan Organization for Metals and Energy Security (JOGMEC), the Japanese Ministry of Economy, Trade and Industry (METI) and KNPL's Japanese Consortium (JC) at KNPL's West Perth Office ahead of a site visit to the KNP Goongarrie Hub.

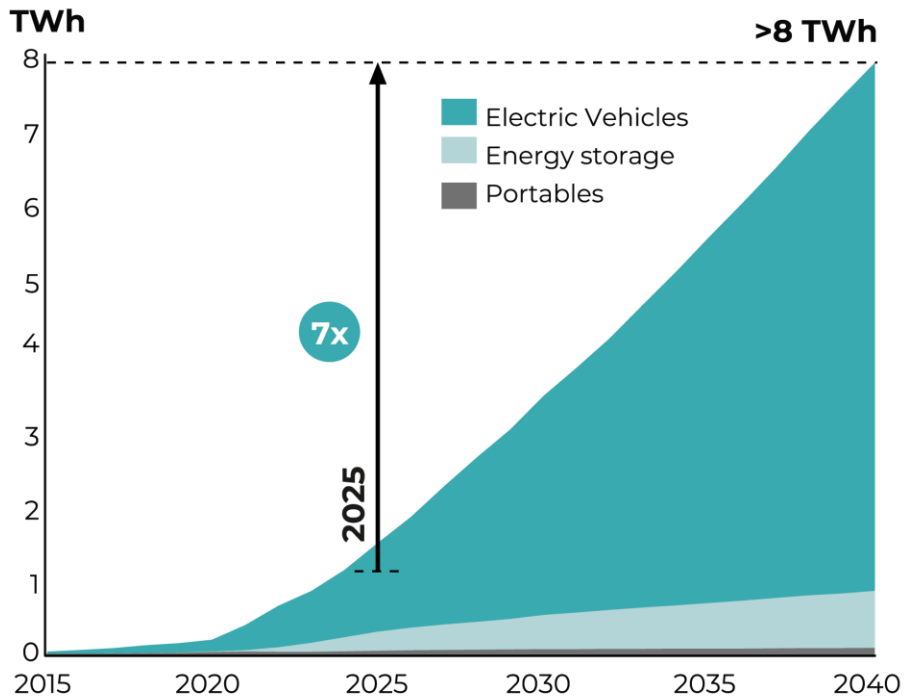




# Battery demand to grow 7-fold by 2040

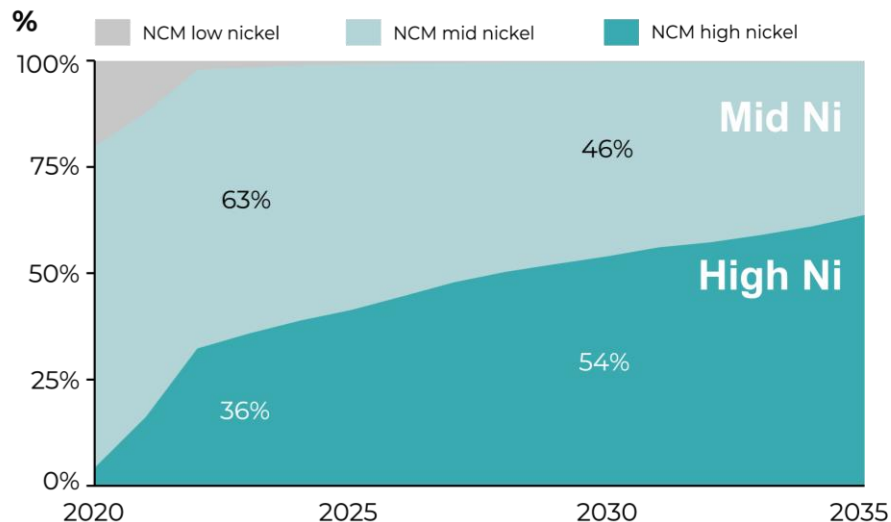
Record 17 million Electric Vehicles (EV) sales for 2024, global EV sales grew by 25% in 2024 compared to 2023<sup>1</sup>

## Battery demand by market segment



Increased battery demand, along with increase in use of high-nickel cathodes will result in growing nickel demand

## NCM cathode demand by chemistry





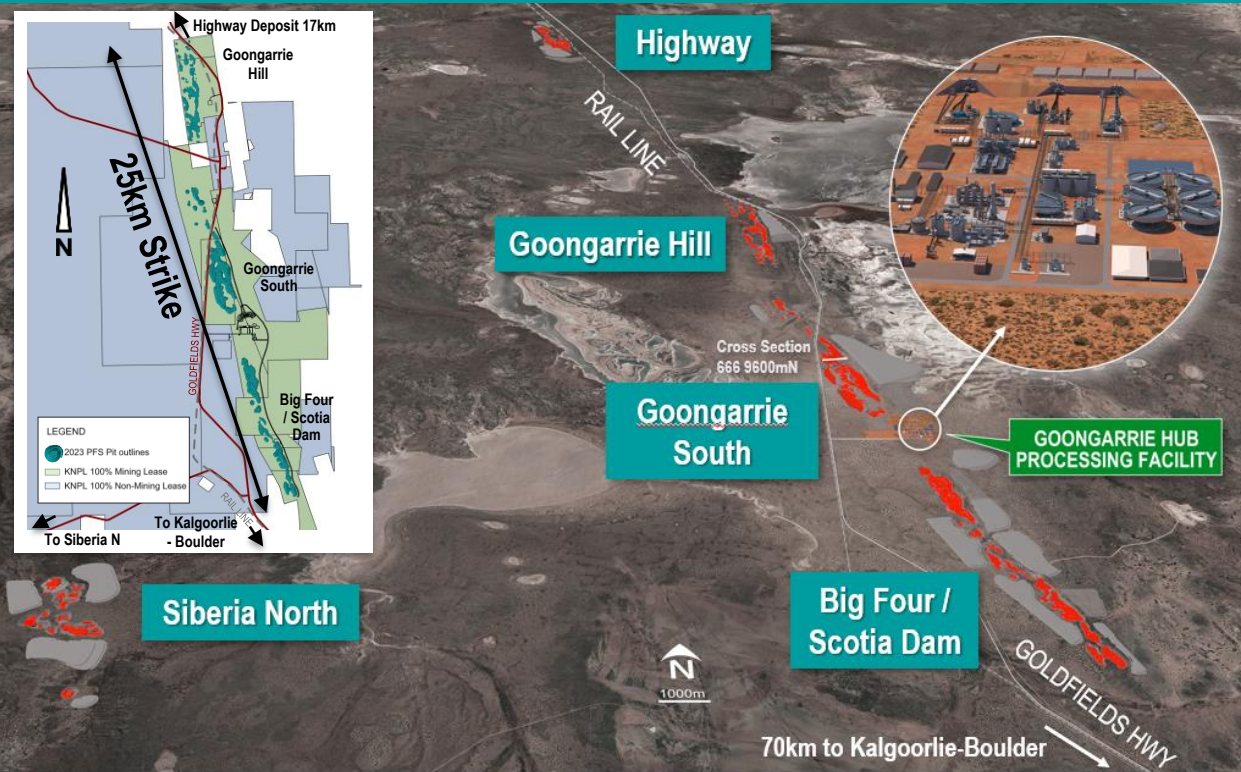


# Large scale, long life project with expansion potential

The nationally strategic KNP Goongarrie Hub to strengthen the battery minerals supply chain for decades

## Significant source of low cost Nickel-Cobalt for >40years

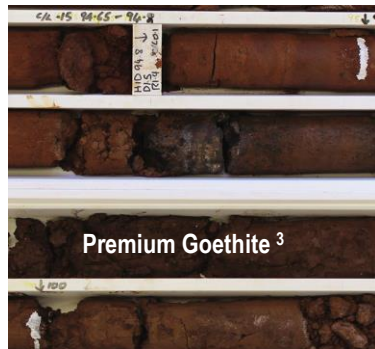
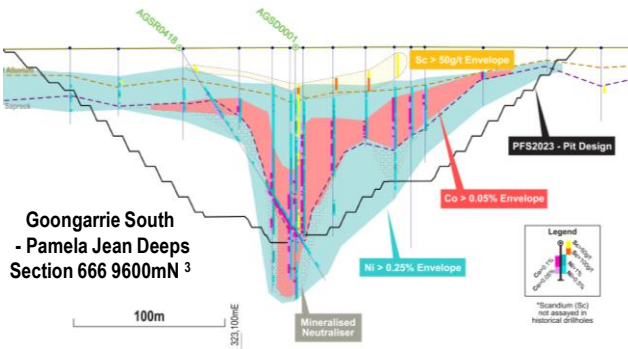
- July 2023 PFS indicated on average 30ktpa Ni and 2ktpa Co at low costs for >40years,<sup>1</sup> attracting quality Strategic Partners<sup>2</sup>
- High Pressure Acid Leach (HPAL) x2, 1.75Mtpa autoclaves (for 3.5Mtpa) and 0.5Mtpa Atmospheric Leach (AL) circuit producing high quality, high purity (~60% Ni) Mixed Sulphide Precipitate (MSP)<sup>3</sup>
- **DFS is expected to show increase** in annual Ni-Co production due to:
  - Increased throughput, from 3.5Mtpa (PFS) to **4Mtpa** (DFS)<sup>4</sup>





# KNP Goongarrie Hub – Unique low cost characteristics

Potential lowest cost producer thanks to a number of ore deposit characteristics & geometry



## KNP Goongarrie Hub

- **25km continuous strike of soft, mainly free-digging premium Goethite best in class plant feed makes up 69% of the direct Plant Feed defined in 2023 PFS<sup>1</sup>**
- **Goethite premium ore** contributes to low acid consumption and energy requirements
- **Conventional low-cost open pit mining** with mining costs <12% of total OPEX with 2023 PFS<sup>1</sup> pit schedule very low LOM strip ratio of 1.8:1 (waste:ore)
- **Mineralised Neutraliser (MN)**, within designed pits will replace imported neutralising material – reducing need to import lime, **increasing metal recovery, reducing costs and emissions**. An International Patent Application has been lodged for this process<sup>2</sup>

1 See 5 July 2023 ARL PFS ASX Announcement. NB: Project MRE, Ore Reserve, Production, Operation & Financial numbers are being updated in current in-progress DFS

2 See 16 November 2022 ARL MN ASX Announcement, Appendix 1 for assays of MN in AHID0012 20-22m photographed and 15 June 2023 ARL MN ASX Announcement

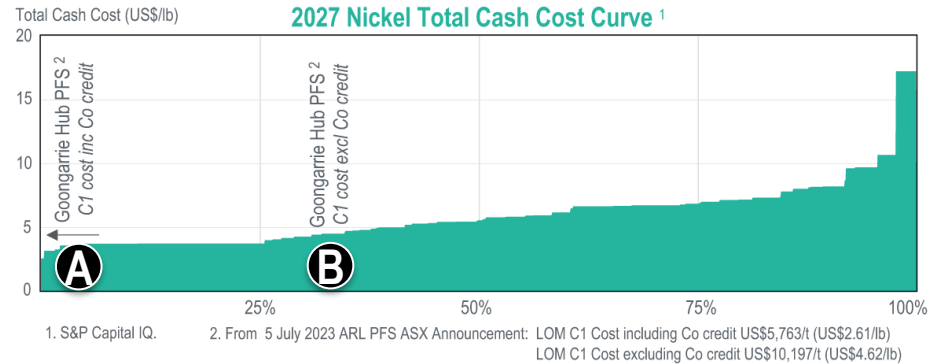
3 See 8 October 2018 High-grade nickel-cobalt mineralisation extended at Goongarrie for AGSD001 as shown on cross section and in photograph for the 96-102m interval.

# Expected to be cost competitive with global peers

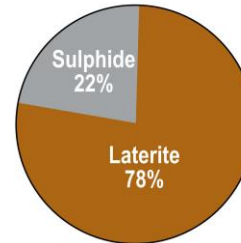
KNP Goongarrie Hub estimated operating costs of US\$6,000 to US10,000 per tonne Ni asset<sup>2</sup>

- Goongarrie Hub PFS Ore Reserve<sup>2</sup> **194.1Mt** at **0.70% Ni** and **0.05% Co** for **1.36Mt of nickel** and **99,000t of cobalt** to sustain production of **~30,000t of nickel** and **2,000t of cobalt per year for > 40 years**
- KNP Goongarrie Hub PFS- Low C1 Opex after Cobalt credit of **US\$5,763/t Ni** in MHP LOM<sup>2</sup> compares well with Indonesian Opex and lower than most current producers
- KNP Goongarrie Hub **low cost** and **long mine life**, mean the project will be able to operate throughout several commodity price cycles.

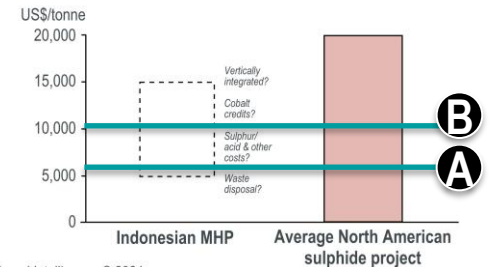
2. See full tables in Appendix and 5 July 2023 ARL PFS ASX Announcement  
 A. LOM C1 Cost including Co credit US\$5,763/t<sup>2</sup>  
 B. LOM C1 Cost excluding Co credit US\$10,197/t<sup>2</sup>  
 NB: Project MRE, Ore Reserve, Production, Operational and Financial metrics are being updated as part of the in-progress DFS



Share of 2023 nickel production by ore type



Approximate Ni production costs by route



Courtesy of Benchmark Mineral Intelligence © 2024  
 Data: Benchmark Nickel Forecast

# Accessing & growing a skilled workforce



## A skilled diverse workforce will grow with the KNP Goongarrie Hub

### Kalgoorlie Nickel Project Goongarrie Hub

CONSTRUCTION  
WORKFORCE

~3,000

+ Specialist  
Consultants

OPERATIONAL  
WORKFORCE

>800

multi-decade jobs in  
mining, production,  
maintenance, support  
& administration

+ indirect jobs

Aspire to create skill pathways &  
opportunities within the region

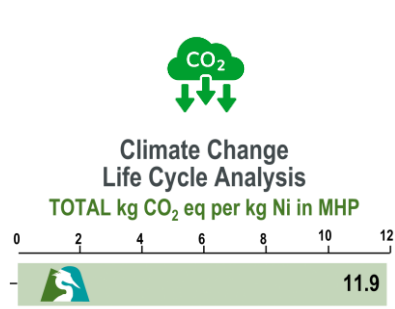
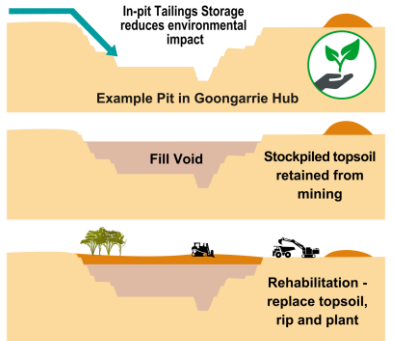
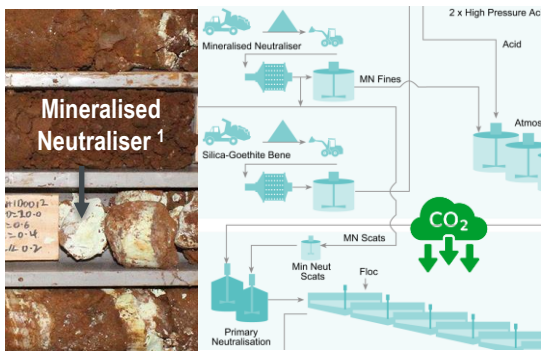


- KNPL has already built the DFS team to 40, whilst also employing multiple consultants and service providers
- **Construction workforce will peak at approximately 3,000** and will be a mix of on site village, goldfields residential and FIFO
- **Operational workforce will comprise of local & FIFO skilled professionals and support staff totalling over 800 jobs for >40 years**
- This **multi-decade** operation to also significantly grow indirect jobs in the WA Goldfields, State and Nation & strengthen local WA School of Mines and TAFE
- Ardea aspire to create **meaningful skill pathways and opportunities** for First Nations and regional communities, through respectful and innovative collaborations

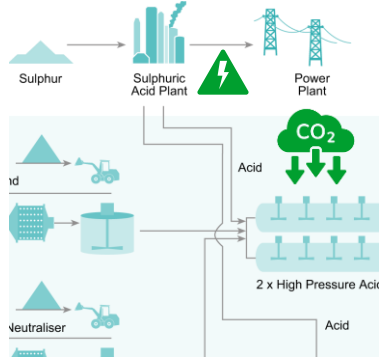
Workforce estimates presented are based on past and current studies, and other industry examples. Indirect employment is not included in estimates. e.g. boost to local employment in City of Kalgoorlie-Boulder and Shire of Menzies site services, hospitality, equipment maintenance, logistics, educational, training and more.

# Innovated approach to elevate ESG performance

## Continual improvement within a responsible ESG framework, enhanced by innovation in plant design



Minviro LCA 2023 report to Ardea - 5 July 2023 PFS



- Ardea's R&D defined **MN**, within designed pits. This material can replace imported neutralising material – reducing need to import lime, **increasing metal recovery, reducing costs and emissions**. An International Patent Application has been lodged for this process<sup>1</sup>
- **In-pit tailings storage** evaporation, suited to the semi-arid environment, improving rehabilitation outcomes<sup>2</sup>
- Excess steam from Acid Plant will be fed to **onsite power plant** reducing CO<sub>2</sub> emissions<sup>2</sup>
- **Life Cycle Assessment (LCA)** is expected to be **11.9 kg CO<sub>2</sub> eq. per kg nickel in MHP** based on project and upstream emissions<sup>2</sup>
- Recent **“A” Score** from Digbee ESG™ for Ardea and KNP activities, demonstrates continuous improvement in ESG performance<sup>3</sup>



Digbee ESG™



1 See 16 November 2022 ARL MN ASX Announcement, Appendix 1 for assays of MN in AHID0012 20-22m photographed and 15 June 2023 ARL MN ASX Announcement

2. See 5 July 2023 ARL PFS ASX Announcement.

3. See 9 May 2023 ARL ESG ASX Announcement.

Recruiting and retaining the best person for the job to build a skilled and passionate team

**Workforce of ~50 across Ardea & KNPL with 50:50 gender split**

Leading the way on gender equality



Ardea's Indigenous Education Grant program has already helped young First Nations groups and individuals. We aspire to engage early with **First Nations Communities for meaningful outcomes & partnerships**



Environmentally responsible and innovative design to **reduce CO<sub>2</sub> emissions & environmental footprint.**

Replacing imported lime with MN, turning steam from acid plant to power, and using in-pit tailings disposal



Strong leadership & Corporate Governance to **deliver a diverse, resilient and sustainable Critical Minerals supply chain, to meet global and National net zero ambitions**





# Fully funded DFS underway at KNP Goongarrie Hub

Significant progress has been made on DFS workstreams, with DFS completion expected second half of 2025



RC Infill Drilling  
KNP Goongarrie Hub

- Infill RC drill program progressed to 37,842m of the planned 48,800m by December 2024. This program focused on **upgrading nickel-cobalt laterite mineral resource estimates (MRE)** to the Measured category for the initial five years of mining. 790m of diamond drilling at Big Four, Scotia Dam and Goongarrie South deposits twinned RC holes for quality control, metallurgy testing and MRE work. Logging, sampling, assaying and modelling continues.
- Bench-Scale metallurgical testing focused on leaching tests, including assessing ore reduced autoclave residence time to **validate the increased annual throughput to 4Mtpa**.
- Hydrogeology and geotechnical campaigns initiated to define water sources, characterise geology and create designs for bore fields.
- Significant DFS progress has been made in process plant design, equipment specifications, risk reviews, and H<sub>2</sub>S plant study.
- Non-Process Infrastructure (NPI) village location, designs and layouts advanced, with building foundation geotechnical drilling quotes prepared.
- Expanded environmental baseline surveys completed to updated environmental standards.
- ESG consultant(s) shortlisted; water pipeline studies and regulatory applications underway; active collaboration with stakeholders.
- Advancing the application **for Lead Agency Status** with Department of Jobs, Tourism, Science and Innovation, a department of the WA Government (JTSI).



# KNP Goongarrie Hub DFS – current and upcoming

Ardea is working collaboratively with the Consortium toward completion of the DFS and a clear path to FID

KNPL Geologists inspect  
Diamond Drill Core at  
KNP Goongarrie Hub



- SRK consultants are completing the resource block models for the Project. Initial focus will be the models for **Goongarrie Hill** and **Siberia North** deposits, with block model work for **Big Four/Scotia Dam**, **Goongarrie South**, and **Highway** deposits to commence once full assay results from infill drilling are returned. Preliminary work on the mine models and mining schedules will commence in stages from March 2025.
- Ausenco are the contracted engineers for the Process Plant and are undertaking various option studies to update the PFS process flow sheet from mixed hydroxide precipitate (MHP) to mixed sulphide precipitate (MSP).
- Work will continue on infill resource definition drilling program, which is nearing completion, mine geotechnical and mine hydrogeological field investigations, bore water supply pumping and piping design, early-stage engagement with environmental modellers and NPI village layout and other design work.
- Engagement and collaboration with Native Title claimant groups will advance. Ardea and KNPL are committed to meaningful engagement with First Nations groups.
- As a priority, Ardea and the Consortium are continuing to **discuss the optimum funding strategy post completion of the DFS**. Both SMM and MC have enviable track records of success with strong links to potential debt and equity providers to assist in debt financing optimisation.

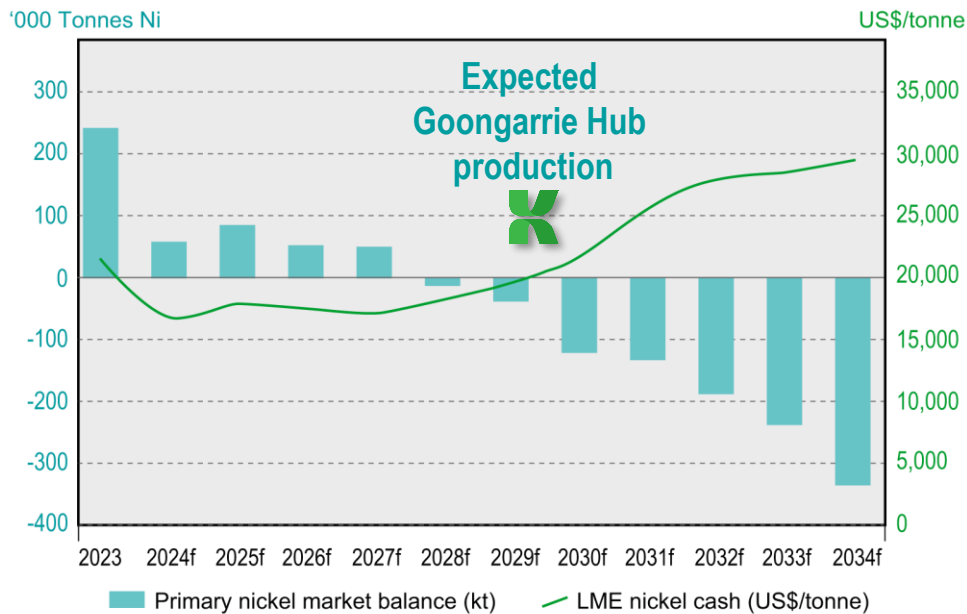




# Goongarrie is well positioned for growing nickel demand

KNP Goongarrie Hub production is aligned with expected nickel market deficits from 2028 onwards

## Nickel Market Balance and Price Forecast



After Source: Fastmarkets Long Term Forecasts 2024

- 2023-24 nickel surplus has led to higher cost producers cutting or ceasing production in Australia (eg BHP) and internationally
- Security and continuity of Critical Mineral supply at risk in poor ESG jurisdictions
- 2025-2027 forecast showing reducing surplus, with supply gap increasing progressively from 2028, with forecast nickel prices correspondingly rising (See Fastmarkets 2024-2027 forecast graph), – **perfectly timed for expected Goongarrie Hub production**
- Security and diversity of nickel supply is imperative. The location, large scale, long life and low cost of the **KNP Goongarrie Hub** makes it **strategically important to Australia's Critical Minerals supply**

# KNP Goongarrrie Hub – is the only Australian nickel project being meaningfully advanced and has best possible Partners, Sumitomo Metal Mining Co., Ltd and Mitsubishi Corporation



**>40 year mine life**  
with expansion potential.  
Producing low cost  
**~30ktpa nickel &  
2ktpa cobalt**<sup>1,2</sup>  
For resilience through  
multiple price cycles



**3,000 Jobs**  
during Construction  
**>800 Operational**<sup>1,2,3</sup>  
**+ indirect jobs**  
Aspire to create equitable  
& skilled pathways &  
opportunities



Project to  
**support local,  
state, national,**  
communities, workers,  
suppliers & stakeholders  
including regional and  
First Nations people



**Long term supply  
of low cost**<sup>1,2</sup>  
**Nickel-Cobalt in  
best jurisdiction**  
Innovative R&D & high  
ESG standards growing  
Australian Ni Sector

1. See 5 July 2023 ARL PFS ASX Announcement and Appendices of this presentation for Key Financial Metrics
2. Project Ore Reserve, production, operation and financial metrics are being updated as part of the in-progress DFS
3. Workforce estimates presented are based on past and current studies, and other industry examples. Indirect employment is not included in this estimate.  
e.g. boost to local employment in City of Kalgoorlie-Boulder and Shire of Menzies site services, hospitality, equipment maintenance, logistics, educational, training and more



**Ardea**  
Resources Limited

**ASX:ARL**

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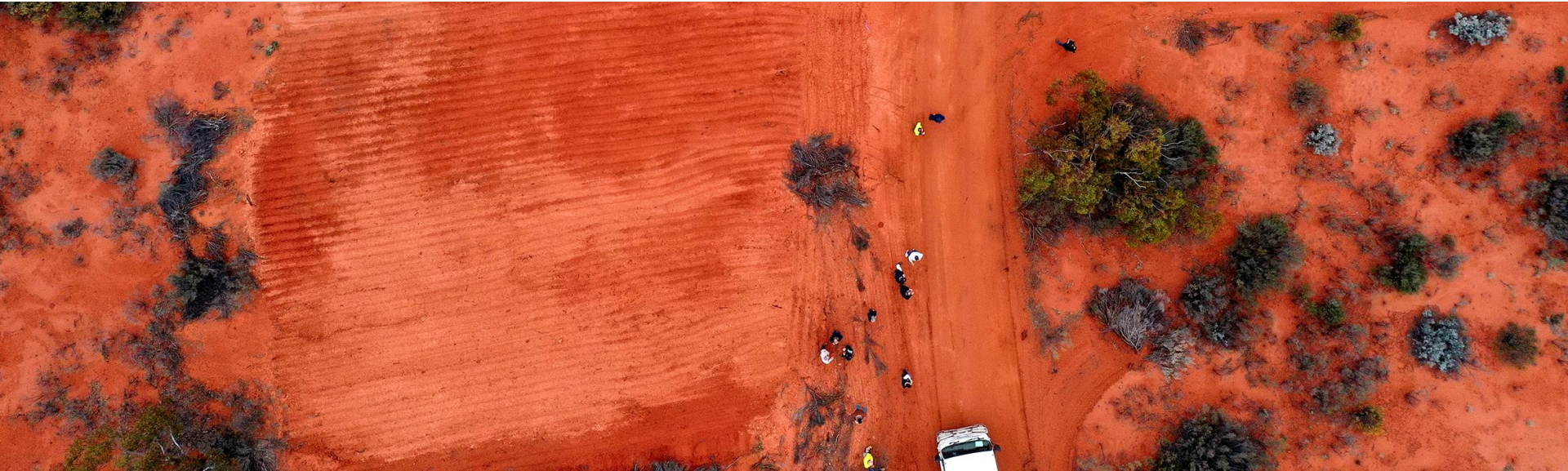
# Appendices



Australian Federal Government  
- Major Project Status

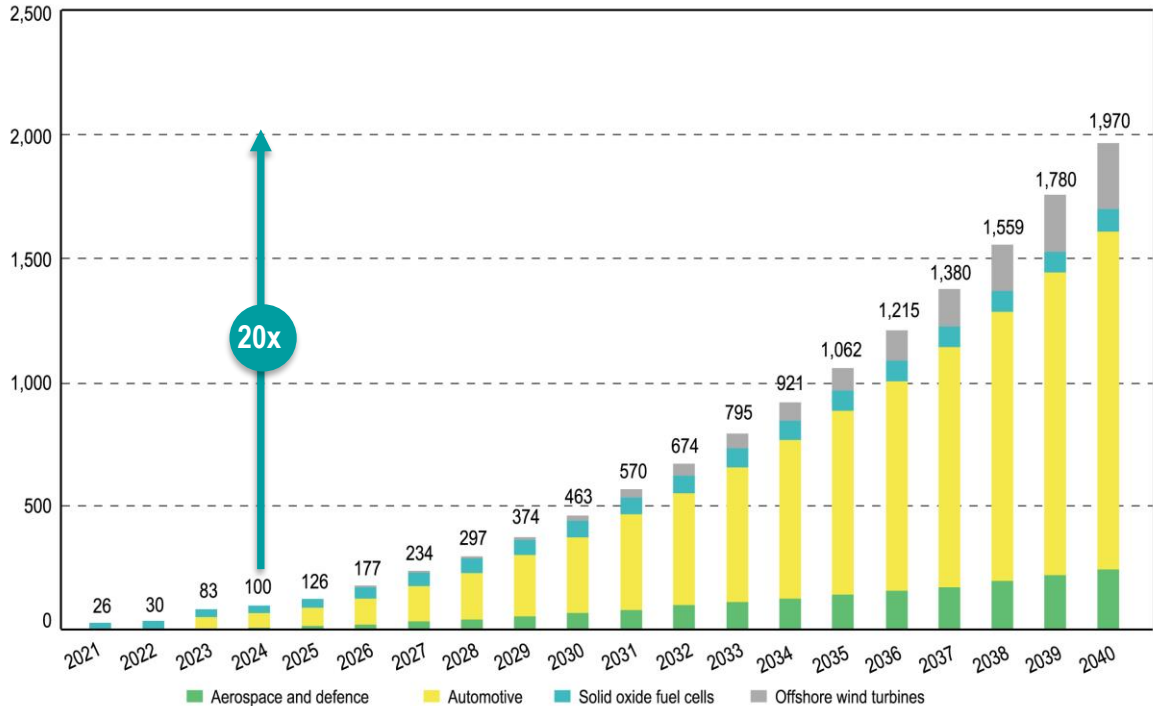


Digbee ESG™



# Potential upside of Scandium as a by-product<sup>1</sup>

Scandium market size estimates, most likely scenario, 2021-2040 tonnes



- Scandium is a lightweight, soft metal with a high melting point, good electrical and heat conductivity.
- Scandium as an alloy, increases the strength of aluminium, reduces its weight and improves other qualities
- Scandium plays an important role in Solid Oxide Fuel Cells
- Scandium alloy in powders for 3D printing is a rapidly growing market

Published on mining.com.au Oct 2024, source Internal EY market study 2022

1. Scandium was not considered in ARL 5 July 2023 PFS

# Appendix 1 - Competent Persons

Information in this presentation has been summarised from ARL ASX MRE Announcement 30 June 2023, ARL ASX PFS Announcement 5 July 2023 and ARL ASX Consortium Announcement 26 April 2024, 14 August 2024 and 30 August 2024.

## Resource Estimation, Exploration Results, and Industry Benchmarking

The Resource Estimation, Exploration Results and Industry Benchmarking summaries are based on information reviewed or compiled by Mr Ian Buchhorn, and Mr Andrew Penkethman. Mr Buchhorn is a Member of the Australasian Institute of Mining and Metallurgy and Mr Penkethman is a Fellow of the Australasian Institute of Mining and Metallurgy and a Member of the Australian Institute of Geoscientists. Both Mr Buchhorn and Mr Penkethman are full-time employees of Ardea Resources Limited and have sufficient experience, which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which they are 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 and Mr Penkethman have reviewed this press release and consent to the inclusion in this report of the information in the form and context in which it appears. Mr Buchhorn and Mr Penkethman own Ardea shares.

Ardea wishes to clarify that its current Kalgoorlie Nickel Project (KNP) Mineral Resource Estimate (MRE) following JORC Code (2012) guidelines is:

KNP	Resource Category	Size (Mt)	Ni (%)	Co (%)	Contained	
					Ni (kt)	Co (kt)
Kalgoorlie Nickel Project Total	Measured	22	0.94	0.079	207	17
	Indicated	361	0.73	0.047	2,622	169
	Inferred	471	0.70	0.043	3,272	200
KNP	Grand Total	854	0.71	0.045	6,101	386

Note: 0.5% nickel cutoff grade used to report resources. Minor discrepancies may occur due to rounding of appropriate significant figures.

The Mineral Resource Estimate information shown in this ASX release has been previously released on the ASX platform by Ardea in ASX release 30 June 2023, in accordance with Listing Rule 5.8. The Mineral Resource Estimate in the above table is inclusive of the Ore Reserve shown in the table opposite.

The Company confirms that it is not aware of any new information or data that materially affects the information included in the previous market announcement noted above and that all material assumptions and technical parameters underpinning the Mineral Resource Estimate in the previous market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Persons' findings are presented have not been materially modified from the original market announcement.

## Ore Reserves

Information in this presentation that relates to Ore Reserves at the Kalgoorlie Nickel Project Goongarrie Hub is based on and fairly represents information and supporting documentation compiled by Mr Jake Fitzsimons, a Competent Person who is a full-time employee of Orelogy Mine Consulting, a company engaged by Ardea. Mr Fitzsimons is a Fellow of the Australasian Institute of Mining and Metallurgy. Mr Fitzsimons has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which is being undertaken 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 (2012 JORC Code). Mr Fitzsimons does not hold securities in Ardea and consents to the inclusion in this announcement of all technical statements based on his information in the form and context in which they appear.

Goongarrie Hub	Ore Reserve Category	Size (Mt)	Ni (%)	Co (%)	Contained	
					Ni (kt)	Co (kt)
Ore Reserve	Proven	16.7	0.96	0.09	160	15
	Probable	177.4	0.68	0.05	1,204	84
	Grand Total	194.1	0.70	0.05	1,365	99

Note: Minor discrepancies may occur due to rounding of appropriate significant figures.

Full details on the Ore Reserve are available in the 5 July Ardea ASX announcement, see Section 5 and Appendix 1.

The Ore Reserve information shown in this ASX release has been previously released on the ASX platform by Ardea in ASX release 5 July 2023, in accordance with Listing Rule 5.9.

Ardea confirms that all the material assumptions underpinning the production target, and the forecast financial information derived from the production target continue to apply and have not materially changed. Noting that the PFS included the inclusion of a small amount of Inferred Mineral Resource (20Mt or 9%) spread over the Life of Mine (page 26 of Ardea 5 July 2023 PFS ASX announcement).

The Company confirms that it is not aware of any new information or data that materially affects the information included in the previous market announcement noted above and that all material assumptions and technical parameters underpinning the Ore Reserve in the previous market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Persons' findings are presented have not been materially modified from the original market announcement.



# Appendix 2 - KNP Global MRE

## KNP Global nickel and cobalt Mineral Resources based on a 0.5% Ni cut-off grade

The Competent Persons (CP) for the Mineral Resources, are Mr Ian Buchhorn and Mr Andrew Penkethman, both are full-time employees of Ardea and consider the resource classification applied to the KNP resource models to reflect appropriate confidence in the input exploration data, geological interpretation and resource grade and tonnage estimates.

Various ASX market releases for the Mineral Resources described have been competed by Ardea, notably:

- 30 June 2023 'Kalgoorlie Nickel Project Mineral Resource Estimate Exceeds 6 Million Tonne Contained Nickel'.
- 16 June 2021 'Highway Nickel Deposit -Mineral Resource Estimate 92 million tonnes at 0.69% nickel and 0.038% cobalt'.
- 15 February 2021 'GNCP High Grade Resource -60 million tonnes at 1.0% nickel Sustainable Long-life Battery Metal Resource Confirmed'.

The Goongarrie Hub Mineral Resources shown in the adjacent table are inclusive of the Ore Reserves shown in this presentation.

					Contained	Contained
KNP Hub	Resource Category	Size (Tonnes)	Ni (%)	Co (%)	Ni (kt)	Co (kt)
<b>Goongarrie Hub</b>	Measured	18,200,000	0.94	0.085	171	15
	Indicated	276,500,000	0.70	0.046	1,923	127
	Inferred	289,300,000	0.67	0.037	1,951	108
	<b>Sub Total</b>	<b>584,000,000</b>	<b>0.69</b>	<b>0.043</b>	<b>4,044</b>	<b>250</b>
<b>Kalpini Hub</b>	Indicated	15,900,000	1.06	0.055	169	9
	Inferred	113,600,000	0.76	0.047	859	53
	<b>Sub Total</b>	<b>129,500,000</b>	<b>0.79</b>	<b>0.048</b>	<b>1,028</b>	<b>62</b>
<b>Yerilla Hub</b>	Measured	3,800,000	0.94	0.048	36	2
	Indicated	68,400,000	0.78	0.049	531	33
	Inferred	67,800,000	0.68	0.057	462	39
	<b>Sub Total</b>	<b>140,000,000</b>	<b>0.73</b>	<b>0.053</b>	<b>1,028</b>	<b>74</b>
<b>Kalgoorlie Nickel Project Total</b>	Measured	22,000,000	0.94	0.079	207	17
	Indicated	360,800,000	0.73	0.047	2,622	169
	Inferred	470,700,000	0.70	0.043	3,272	200
<b>KNP</b>	<b>Grand Total</b>	<b>853,500,000</b>	<b>0.71</b>	<b>0.045</b>	<b>6,101</b>	<b>386</b>

Minor discrepancies may occur due to rounding of appropriate significant figures.

# Appendix 2 continued

## KNP Goongarrie Hub MRE

The Competent Persons (CP) for the Mineral Resources, are Mr Ian Buchhorn and Mr Andrew Penkethman, both are full-time employees of Ardea and consider the resource classification applied to the Goongarrie Hub resource models to reflect appropriate confidence in the input exploration data, geological interpretation and resource grade and tonnage estimates.

Various ASX market releases for the Mineral Resources described have been completed by Ardea, notably:

- 30 June 2023 'Kalgoorlie Nickel Project Mineral Resource Estimate Exceeds 6 Million Tonne Contained Nickel'.
- 16 June 2021 'Highway Nickel Deposit -Mineral Resource Estimate 92 million tonnes at 0.69% nickel and 0.038% cobalt'.
- 15 February 2021 'GNCP High Grade Resource -60 million tonnes at 1.0% nickel Sustainable Long-life Battery Metal Resource Confirmed'.

The Goongarrie Hub Mineral Resources shown in the adjacent table for the Goongarrie South, Highway, Goongarrie Hill, Big Four, Scotia Dam and Siberia North deposits are inclusive of the Ore Reserves shown in this presentation.

KNP Goongarrie Hub nickel and cobalt Mineral Resources based on a 0.5% Ni cut-off grade

Prospect	Resource	Size	Ni	Co	Contained Metal		Estimation Details		
	Category	(Mt)	(%)	(%)	Ni (kt)	Co (kt)	Method	Source	Year
Goongarrie South	Measured	18	0.94	0.085	171	15	LUC	Ardea	2021
	Indicated	82	0.71	0.049	584	40	LUC	Ardea	2021
	Inferred	10	0.64	0.033	61	3	LUC	Ardea	2021
Highway	Indicated	71	0.69	0.038	487	27	LUC	Ardea	2023
	Inferred	21	0.67	0.04	141	8	LUC	Ardea	2023
Ghost Rocks*	Inferred	47	0.66	0.042	312	20	OK	Snowden	2004
Goongarrie Hill	Indicated	40	0.65	0.037	259	15	LUC	Ardea	2021
	Inferred	29	0.6	0.025	176	7	LUC	Ardea	2021
Big Four	Indicated	49	0.71	0.047	346	23	LUC	Ardea	2021
	Inferred	14	0.68	0.043	96	6	LUC	Ardea	2021
Scotia Dam	Indicated	12	0.71	0.065	82	7	LUC	Ardea	2021
	Inferred	5	0.72	0.043	37	2	LUC	Ardea	2021
Goongarrie Subtotal	Measured	18	0.94	0.085	171	15			
	Indicated	253	0.69	0.044	1,758	112			
	Inferred	127	0.65	0.037	823	47			
	Combined	398	0.69	0.044	2,753	175			
Siberia South*	Inferred	81	0.65	0.033	525	27	OK	Snowden	2004
Siberia North	Indicated	14	0.72	0.042	102	6	Ni (UC), Co (OK)	Snowden	2009
	Inferred	72	0.74	0.034	534	25	Ni (UC), Co (OK)	Snowden	2009
Black Range*	Indicated	9	0.67	0.09	62	8	OK	HGMC	2017
	Inferred	10	0.69	0.1	68	10	OK	HGMC	2017
Siberia Subtotal	Indicated	24	0.7	0.061	165	14			
	Inferred	163	0.69	0.038	1,127	61			
	Combined	186	0.69	0.04	1,292	75			
<b>KNP Goongarrie Hub TOTAL</b>	Measured	18	0.94	0.085	171	15			
	Indicated	277	0.7	0.046	1,923	127			
	Inferred	289	0.67	0.037	1,951	108			
	Combined	<b>584</b>	<b>0.69</b>	<b>0.043</b>	<b>4,044</b>	<b>250</b>			

\*Note - Mineral Resources that are not considered in 2023 PFS.



# Appendix 2 cont - KNP Goongarrie Hub Ore Reserve Summary

KNP Goongarrie Hub Ore Reserve Summary consisting of ore above 0.5% Ni as the feed stock for the processing facility, and ore as Mineralised Neutraliser above 0.5% Nieq and LOI above 25%

## Notes:

- The Ore Reserve is reported in accordance with JORC Code 2012.
- Ore reserves are reported at a cut-off of 0.5% Ni for primary feed stock to the processing facility, plus mineralised neutraliser as ore at a cut-off of 0.5% Ni Equivalent (NiEq) and Loss on Ignition (LOI) above 25%.
- NiEq defined using  $Ni + 2.32 \times Co$ . It is the company's opinion that all the elements included in the metal equivalents calculation have a reasonable potential to be recovered and sold.
- The Ore Reserve was evaluated using a base price of US\$22,000/t for Ni and US\$51,000/t for Co at 85% payable for a Mixed Hydroxide Precipitate (MHP) product, and an exchange rate 0.69 USD/AUD.
- Ore Reserves account for mining dilution and mining ore loss.
- Ore Reserves are reported on a Dry Tonnage Basis.
- Process Recovery - AL 72% Ni and Co. HPAL direct feed and post beneficiation Ni 97% and direct feed and post beneficiation Co 97.4%. MN post beneficiation recoveries Ni 86.5% and Co 75.3%. Average beneficiation mass yield was 33.7%.
- Proven Ore Reserves are based on Measured Mineral Resources only and Probable Ore Reserves are based on Indicated Mineral Resources only.
- The sum of individual amounts may not equal due to rounding.
- This Ore Reserve estimate is for a subset of the KNP Goongarrie Hub deposits being Goongarrie South, Big Four / Scotia Dam, Goongarrie Hill, Highway and Siberia North.
- The Ore Reserve Summary was detailed in ARL ASX PFS Announcement, 5 July 2023.
- Minor discrepancies may occur due to rounding of appropriate significant figures.
- The Goongarrie Hub Mineral Resources shown in the prior slide for the Goongarrie South, Highway, Goongarrie Hill, Big Four, Scotia Dam and Siberia North deposits are inclusive of the Ore Reserves shown in this presentation.

Deposit	Ore >= 0.5% Ni					Ore > 0.5% NiEq and LOI > 25%					Total Ore				
	Mt	Ni %	Co %	Ni kt	Co kt	Mt	Ni %	Co %	Ni kt	Co kt	Mt	Ni %	Co %	Ni kt	Co kt
<b>Proven</b>															
Goongarrie South	16.7	0.96	0.09	160	15	0.05	0.43	0.03	0.20	0.01	16.7	0.96	0.09	160	15
<b>Sub-total</b>	<b>16.7</b>	<b>0.96</b>	<b>0.09</b>	<b>160</b>	<b>15</b>	<b>0.05</b>	<b>0.43</b>	<b>0.03</b>	<b>0.20</b>	<b>0.01</b>	<b>16.7</b>	<b>0.96</b>	<b>0.09</b>	<b>160</b>	<b>15</b>
<b>Probable</b>															
Big Four/Scotia Dam	34.9	0.76	0.07	265	23	0.8	0.38	0.04	3	0	35.7	0.75	0.06	268	23
Goongarrie South	33.6	0.79	0.07	265	23	1.8	0.40	0.03	7	1	35.4	0.77	0.07	272	24
Goongarrie Hill	15.8	0.70	0.04	110	7	0.1	0.44	0.02	0	0	15.9	0.70	0.04	111	7
Highway	54.0	0.70	0.04	380	22	27.2	0.39	0.01	106	4	81.2	0.60	0.03	486	26
Siberia North	9.2	0.74	0.05	68	4	-	-	-	-	-	9.2	0.74	0.05	68	4
<b>Sub-total</b>	<b>147.4</b>	<b>0.74</b>	<b>0.05</b>	<b>1,087</b>	<b>79</b>	<b>29.9</b>	<b>0.39</b>	<b>0.02</b>	<b>117</b>	<b>5</b>	<b>177.4</b>	<b>0.68</b>	<b>0.05</b>	<b>1,204</b>	<b>84</b>
<b>PROVEN AND PROBABLE TOTAL</b>															
Big Four/Scotia Dam	34.9	0.76	0.07	265	23	0.8	0.38	0.04	3	0	35.7	0.75	0.06	268	23
Goongarrie South	50.2	0.85	0.08	425	38	1.9	0.40	0.03	7	1	52.1	0.83	0.07	432	39
Goongarrie Hill	15.8	0.70	0.04	110	7	0.1	0.44	0.02	0	0	15.9	0.70	0.04	111	7
Highway	54.0	0.70	0.04	380	22	27.2	0.39	0.01	106	4	81.2	0.60	0.03	486	26
Siberia North	9.2	0.74	0.05	68	4	-	-	-	-	-	9.2	0.74	0.05	68	4
<b>TOTAL</b>	<b>164.1</b>	<b>0.76</b>	<b>0.06</b>	<b>1,247</b>	<b>94</b>	<b>30.0</b>	<b>0.39</b>	<b>0.02</b>	<b>117</b>	<b>5</b>	<b>194.1</b>	<b>0.70</b>	<b>0.05</b>	<b>1,365</b>	<b>99</b>



# Appendix 3 - PFS Key Financial Metrics

## PFS defines > 40-year operation with strong financial metrics<sup>1</sup>:

- Pre-tax NPV<sub>7</sub> of **A\$7,625M** (IRR 30%)
- Post-tax NPV<sub>7</sub> of **A\$4,980M** (IRR 23%)
- Average Annual EBITDA of **A\$800M**
- Project **pay back within 3.1 years**
- Low cost after Cobalt credit of **US\$5,763/t Ni in MHP LOM**

1. See 5 July 2023 ARL PFS ASX Announcement.
2. Post tax.
3. From start of operation.

NB: Project MRE, Ore Reserve, Production, Operation and Financial numbers are being updated as part of the in-progress DFS

### Financials

Nickel Revenue	A\$ M	44,429
Cobalt Revenue	A\$ M	7,880
Revenue - combined	A\$ M	52,309
EBITDA LOM	A\$ M	34,217
EBITDA Annual (average)	A\$ M	800
EBITDA margin	%	65%
Net Cash Flow (Pre-tax)	A\$ M	31,100

### Valuation

Net Present Value (NPV <sub>7</sub> ) <sup>2</sup>	A\$ M	4,980
Internal Rate of Return (IRR) <sup>2</sup>	%	23%
Total Capital Payback <sup>3</sup>	years	3.1

### Assumptions

Exchange rate	AUD:USD	0.67
Nickel Price	US\$/t	25,000
Cobalt Price	US\$/t	60,000

# Appendix 3 continued - PFS 2023 Capital Cost Estimate

## KNP – Goongarrie Hub

- Contingency considered appropriate to the level of the capital cost estimate has been included
- Base date March 2023
- Refer to 5 July 2023 ARL PFS ASX Announcement for full details and Reasonable Basis Statement

Preproduction Cost Category	Costs (A\$)
Mining – overheads, mobilisation, pre-strip and other	98M
Process plant & infrastructure	2,264M
Sulphuric acid, steam and power plant	574M
Borefield	181M
<b>Total Capital Cost<sup>1</sup></b>	<b>3,117M</b>

Ardea 5 July 2023 PFS capital cost estimate based on a 3.5Mtpa processing operation consisting of x2, 1.5Mtpa HPAL autoclaves and a 0.5Mtpa Atmospheric leach circuit.



# Appendix 3 continued - DFS Key Budget Items

The Consortium (SMM and MC) will fund 100% of the KNP Goongarrie Hub DFS costs, up to the agreed budget of A\$98.5 million

DFS Cost Centre	Costs (A\$)
Drilling	13.4M
Metallurgical Test Work	2.3M
Mine Design (incl dewatering & geotechnical)	15.0M
Process Plant Design	28.3M
Buildings and Camp Design	5.3M
Approvals	4.9M
Staff, Corporate and Other	26.2M
Other Expert Consultants	1.5M
Tenement Costs	1.6M
<b>DFS Total Budget</b>	<b>98.5M</b>

# Appendix 3 cont – KNP Goongarrie Hub Superior HPAL Intensity

- ✓ Good ore grade + good slurry density = Lower Capex & Opex \$\$
- ✓ Atmospheric leach = stable operation, utilizes saprolite resource
- ✓ MHP & MSP Product = known technology & good market acceptance



## Operating data from Australian HPAL Producers

Performance Driver	Ardea	Bulong#	Cawse#	Murrin	RNO <sup>^</sup>	Metric	Ardea Rank	Comment
Atmospheric Leach	Yes	No	No	No	Yes	-	#1	Stable operation and full resource utilisation
HPAL Feed Density	45%	31%	35%	38%	42%	% Solids	#1	The higher the better = Maximises plant throughput
Residence Time	70*	75	105	90	60	minutes	#2	The lower the better = Maximises plant throughput
Slurry Grade Ni	7.55	2.89	3.07	3.87	7.39	Ni kg/m3	#1	The higher the better = Increased revenue stream
Slurry Grade Co	0.59	0.23	0.24	0.34	0.31	Co kg/m3	#1	The higher the better = Strategic Co-Product credits

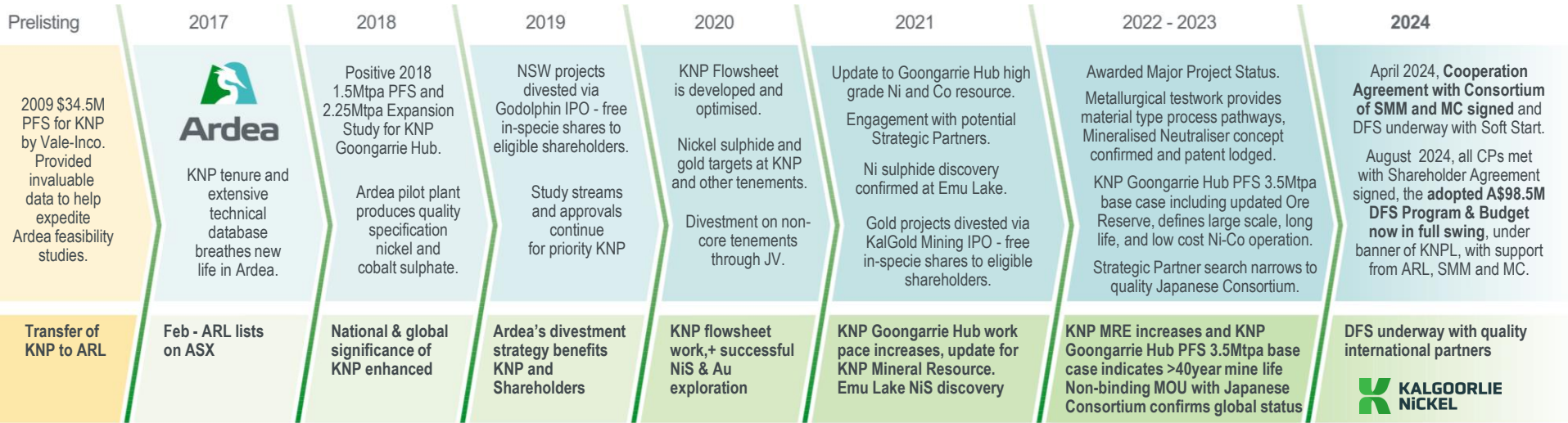
Data Sources: Ardea – Goongarrie Hub testwork results from PFS and Expansion Study, ASX release 28 March 2018 & Goongarrie Expansion Study, 24 July 2018 and ongoing project assessment as part of completing the DFS. Bulong, Cawse, Murrin - ALTA 1999, An Engineering Comparison of the Three Treatment Flowsheets In WA Nickel Laterite Projects. RNO – ALTA 2001, Observations from the RNO Pilot Plant at Lakefield Research, 2000 AD.

<sup>^</sup>Ravensthorpe Nickel Operation (RNO) figures based on design numbers on upgraded beneficiated ore from the Halley's Deposit which has since been mined out. # Bulong & Cawse – care and maintenance

Ardea data is based on non-beneficiated material (with always an option to beneficiate selected KNP geo-met types, notably at Highway & Goongarrie Hill).

\*Goongarrie Hub DFS to assess reduction in Ardea residence time from 70 minutes to 60 minutes. Residence time 45 minutes estimated in Goongarrie Expansion Study (ASX announcement 24 July 2018)

# 25 years of Goongarrie Hub stakeholder engagement and ore body knowledge



**KNP Mineral Resource**

**773Mt @ 0.70% Ni and 0.05% Co**

**830Mt @ 0.71% Ni and 0.046% Co**

**854Mt @ 0.71% Ni and 0.045% Co**

**Update in Progress as part of Definitive Feasibility Study (DFS)**

