Ardea Resources Limited

ASX & Media Release

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ASX Symbol

ARL

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Issued Capital

Fully Paid Ordinary Shares
90,639,331

Unlisted options exercisable at $0.25
12,310,022

Unlisted Loyalty options exercisable at $0.77
15,547,524

Directors/Employee Performance Rights
4,485,000

ABN 30 614 289 342

Resource Update at KNP Cobalt Zone delivers over 100 million tonnes

Significant increase in resource defined in preparation for the Pre-Feasibility Study mining schedule

- An updated KNP Cobalt Zone resource has increased markedly to **108.3 Mt at 0.10 % cobalt and 0.79 % nickel**[1]
  - Includes over **108,000 tonnes of contained cobalt metal** and over **856,000 tonnes of nickel metal**
- Increased tonnages are from Goongarrie area:
  - Reflects **revenue-driven cobalt and nickel focus** for mining schedules defined for the PFS on the Goongarrie Nickel Cobalt Project with increased inclusion of nickel blocks
  - Reported resources are captured within conceptual PFS pit shells
  - Shallow, lateritic, cobalt-nickel mineralisation is up to **16 km long and 1 km wide**.
- PFS finalisation progressing

Ardea Resources Limited (ASX: ARL, "Ardea" or "the Company") is pleased to announce updated resources to support the Pre-Feasibility Study (PFS) on our prime development project, the Goongarrie Nickel Cobalt Project (GNCP). The resources are significant upgrades and represent the initial cobalt and nickel mining inventory that the Company intends to develop at Goongarrie.

[1] Breakdown for the KNP Cobalt Zone resource is as follows. See remainder of document for details.

Area	Prospect	Resource category	Cut-off	Tonnage (Mt)	Co (%)	Ni (%)
Goongarrie	Goongarrie South	Total	≥ 0.08 Co or ≥ 0.5%Ni	53.1	0.10	0.82
	Big Four	Total	≥ 0.08 Co or ≥ 0.5%Ni	25.0	0.10	0.77
	Scotia Dam	Total	≥ 0.08 Co or ≥ 0.5%Ni	5.0	0.11	0.87
	Goongarrie subtotal	*Total*	*≥ 0.08 Co or ≥ 0.5%Ni*	*83.1*	*0.10*	*0.81*
Siberia	Black Range	Total	≥ 0.5% Ni	19.2	0.09	0.68
Yerilla	Aubils	Total	≥ 0.08 Co	6.0	0.15	0.90
KNP TOTAL		**Total**	**≥ 0.08 Co or ≥ 0.5%Ni**	**108.3**	**0.10**	**0.79**

Resource Update for the KNP Cobalt Zone

A new, substantially larger resource for the KNP Cobalt Zone is presented here as **108.3 Mt at 0.10 % cobalt and 0.79 % nickel**. In total the KNP Cobalt Zone contains **over 108,000 tonnes of cobalt metal** and **over 856,000 tonnes of nickel metal**.

Table 1 - KNP Cobalt Zone from RMRC and HGMC consulting groups. See Table 2 for breakdown of the new Goongarrie resource estimates. All figures are rounded to appropriate significant figures reflect the degree of certainty.

Camp	Deposit(s)	Resource category	Cut-off %	Size (Mt)	Cobalt (%)	Nickel (%)	Contained metal Co (t)	Contained metal Ni (t)	Remodel status
Goongarrie	Goongarrie South	Total	≥ 0.08% Co or ≥ 0.5%Ni	53.1	0.10	0.82	52,000	436,600	ARL, March 2018
	Big Four	Total	≥ 0.08% Co or ≥ 0.5%Ni	25.0	0.10	0.77	24,000	192,100	ARL, March 2018
	Scotia Dam	Total	≥ 0.08% Co or ≥ 0.5%Ni	5.0	0.11	0.87	5,600	43,600	ARL, March 2018
	Goongarrie subtotal		*≥ 0.08% Co or ≥ 0.5%Ni*	*83.1*	*0.10*	*0.81*	*81,600*	*672,300*	*ARL, March 2018*
Siberia	Black Range	Total	≥ 0.5% Ni	19.2	0.09	0.68	17,800	130,600	ARL, August 2017
Yerilla	Aubils	Total	≥ 0.08% Co	6.0	0.15	0.90	9,000	54,000	Heron, 2009
KNP Cobalt Zone TOTAL		Total	≥ 0.08% Co or ≥ 0.5%Ni	**108.3**	**0.10**	**0.79**	**108,400**	**856,900**	ARL, March 2018

All of the updated resources pertain to Goongarrie area resources. Resources at Black Range and Aubils at this time remain unchanged.

The updated Cobalt Zone resource reporting for Goongarrie

The updated resource for the Cobalt Zone at Goongarrie (blue areas, Figure 1) defines **83.1 Mt at 0.10 % cobalt and 0.81 % nickel**. The corresponding contained metal estimates are **81,700 t cobalt metal** and **672,300 t nickel metal**. This includes mineral resources at Goongarrie South, Big Four, and Scotia Dam which occur within a continuous mineralised zone extending over 16 km in strike length north to south and is locally over 1 km wide. A breakdown of the Goongarrie resource follows:

Table 2 – Summary of total mineral resources within the Cobalt Zone portion of the Goongarrie Nickel Cobalt Project area at Goongarrie, comprising resources at Goongarrie South, Big Four, and Scotia Dam.

Deposit(s)	Domains	Cut-off %	Resource category	Size (Mt)	Cobalt (%)	Nickel (%)	Contained metal Co (t)	Contained metal Ni (t)
Goongarrie South	Cobalt Zone	≥ 0.08 Co or ≥ 0.5%Ni	Measured	6.8	0.13	1.10	8,900	74,700
			Indicated	31.7	0.09	0.80	28,600	252,200
			Inferred	14.6	0.10	0.75	14,500	109,700
			Subtotal	*53.1*	*0.10*	*0.82*	*52,000*	*436,600*
Big Four	Cobalt Zone	≥ 0.08 Co or ≥ 0.5%Ni	Indicated	21.5	0.09	0.79	20,100	168,900
			Inferred	3.5	0.11	0.66	3,800	23,200
			Subtotal	*25.0*	*0.10*	*0.77*	*24,000*	*192,100*
Scotia Dam	Cobalt Zone	≥ 0.08 Co or ≥ 0.5%Ni	Indicated	2.2	0.11	0.88	26,200	19,500
			Inferred	2.8	0.11	0.87	3,100	24,100
			Subtotal	*5.0*	*0.11*	*0.87*	*5,600*	*43,600*
All	Cobalt Zone	≥ 0.08 Co or ≥ 0.5%Ni	Measured	6.8	0.13	1.10	8,900	74,700
			Indicated	55.4	0.09	0.80	51,300	440,500
			Inferred	20.9	0.10	0.75	21,400	157,000
Goongarrie Cobalt Zone			**TOTAL**	**83.1**	**0.10**	**0.81**	**81,700**	**672,300**

Note: Cobalt Zone domains comprise cobalt domains and cobalt bearing areas of the nickel domain. The cobalt domains (blue areas, Figure 1) are defined where 1) Co ≥ 0.08% and 2) Co< 0.08% and Ni ≥ 0.5%. From the nickel domain (grey areas, Figure 1), only areas where Co≥0.08% are included. Note that figures are rounded as appropriate to reflect degree of certainty and may not tally exactly.

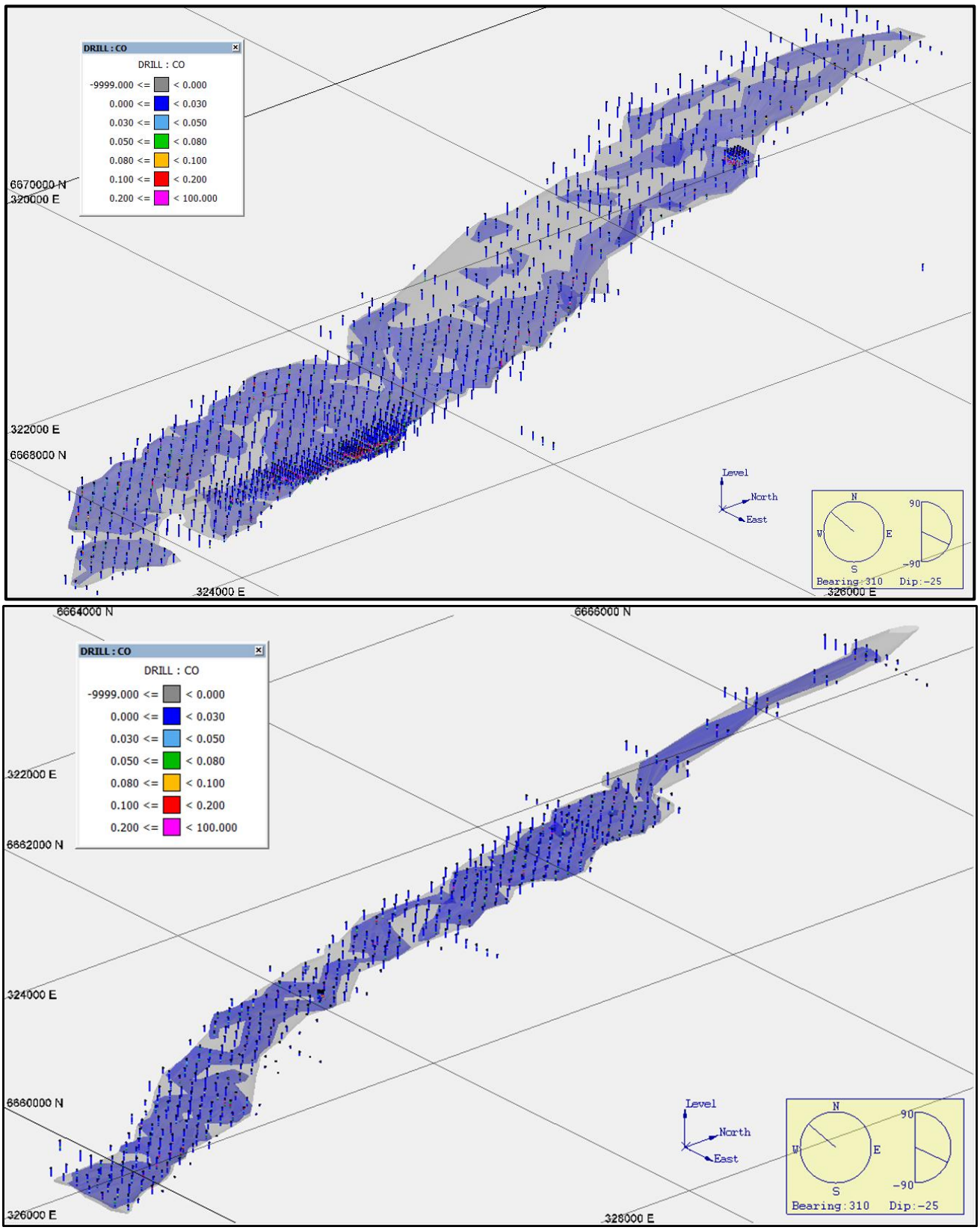

*Figure 1 – 3-D view of Goongarrie South (top) and Big Four (bottom) portions of the Goongarrie Nickel Cobalt Project, showing Nickel (grey) and Cobalt Zone (blue) wireframes used to constrain resource estimation (Nickel wireframe shaded grey based on a notional 0.3% Ni cut-off grade and Cobalt wireframe shaded blue based on a notional 0.05% Co cut-off grade). The Mineral Resources noted above are reported based on cut-off grade criteria: ≥0.08% Co or ≥0.5% Ni within the Cobalt wireframe and ≥0.08% Co only externally within the Nickel wireframe. The Global Mineral Resources within these constraints (as described in Appendix 2) also include the lower grade nickel and cobalt mineralisation externally within the Nickel wireframe and are reported using Global cutoff grade criteria: ≥0.08% Co **or** ≥0.5% Ni. Drilling is colour coded by sample cobalt % grades. Grids are 2,000 m.*

Improvements to the Goongarrie resource

The improvements to the resource are not the result of additional drilling results nor of any significant remodelling exercise. Rather, they are a function of a reappraisal of the focus of mining at Goongarrie during the development of the PFS.

Previous resource estimates at Goongarrie were reported by Ardea in June 2017 using a 0.08 % cobalt cut-off only, ensuring capture of much high-grade nickel mineralisation. However, as the PFS has progressed, metals prices improved dramatically. This positively impacted modelling of mining schedules, and it became clear that blocks containing high-grade nickel mineralisation with moderate cobalt grades (of less than 0.08 %) are a volumetrically and fiscally important component of the deposits.

The net effect is that 40 million tonnes of moderate to high-grade nickel / moderate cobalt mineralisation (reporting < 0.08% Co and $\geq$ 0.5% Ni) have been added to the resource as continuity of mining blocks has improved. Most of this mineralisation is within the Cobalt Zone at Goongarrie (Figure 1) but was not previously reported in the June 2017 Ardea announcement. In these areas, higher nickel grades often correspond to moderate cobalt.

The effect of this updated reporting is that overall cobalt grade is not significantly diminished and nickel grade is maintained. This newly included mineralisation is integral to the resource and indeed to the modelling and planning of the of the mining project, hence the Mineral Resource reporting for Goongarrie has been updated to reflect this.

Pit optimisation and mining potential

This new resource reporting represents mineralisation that is mineable by open pit. A pit optimisation model, which uses various high-level parameters such as current and forecast economic data, proposed production rates, and forecast production costs, portrays several long-range realistic economic models to define conceptual pit designs. The Cobalt Zone resource falls entirely with the conceptual pit optimisation model defined for the PFS.

New Ore Reserves, which represent the economically mineable part of the Measured and Indicated Mineral Resource over the modelled life of mine, will be defined for the PFS.

Pre-Feasibility Study – the Goongarrie Nickel Cobalt Project

The Goongarrie Nickel Cobalt Project is Ardea's prime development project and the subject of the forthcoming PFS. Its focus is the development of the deposits of the Goongarrie camp. Mining schedules highlight the cobalt-rich and nickel-rich portions of the deposits which correspond to the Cobalt Zone at Goongarrie (Figure 1, Table 2).

Mine scheduling on a revenue basis means that it is largely irrelevant whether it is cobalt or nickel that is providing the maximum return. It does not matter if, for example, a mine block contains subgrade cobalt if the nickel grade is sufficiently high – the block will be mined. It is the in-ground value of that block that is the key in scheduling. The updated resources defined in this announcement reflect the focus of the PFS on both cobalt and nickel mineralisation as the basis to optimise mining of these deposits.

Finalisation of the PFS is progressing and the Company looks forward to reporting to shareholders once this process is complete.

For further information regarding Ardea, please visit www.ardearesources.com.au or www.heronresources.com.au or contact:

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Tel +61 8 6244 5136

Compliance Statement (JORC 2012)

A competent person's statement for the purposes of Listing Rule 5.22 has previously been announced by the Company for:

1. *Kalgoorlie Nickel Project on 21 October 2013 and 31 June 2014, October 2016, 2016 Heron Resources Annual Report and 6 January 2017;*
2. *KNP Cobalt Zone Study on 6 January 2017*

The Company confirms that it is not aware of any new information or data that materially affects information included in previous announcements, and all material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed. All projects will be subject to new work programs following the listing of Ardea, notably drilling, metallurgy and JORC Code 2012 resource estimation as applicable.

The information in this report that relates to KNP Exploration Results is based on information originally compiled by previous and current full time employees of Heron Resources Limited. The Exploration Results and data collection processes have been reviewed, verified and re-interpreted by Mr Ian Buchhorn who is a Member of the Australasian Institute of Mining and Metallurgy and currently an executive director of Ardea Resources Limited. Mr Buchhorn has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the exploration activities 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'. Mr Buchhorn consents to the inclusion in this report of the matters based on his information in the form and context that it appears.

The exploration and industry benchmarking summaries are based on information reviewed by Dr Matthew Painter, who is a Member of the Australian Institute of Geoscientists. Dr Painter is a full-time employee and a director of Ardea Resources Limited and has sufficient experience, which is 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'. Dr Painter has reviewed this press release and consents to the inclusion in this report of the information in the form and context in which it appears.

The information in this report that relates to Mineral Resources for the Goongarrie South and Big Four cobalt-nickel deposits contained within the KNP Cobalt Zone project area is based on information compiled by Mr Stephen Hyland who is a Fellow of the Australasian Institute of Mining and Metallurgy and who has provided expert guidance on resource modelling and resource estimation. Mr Hyland is a Principal Consultant Geologist at HGMC consultants 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 Hyland consents to the inclusion in the report of the matters based on this information in the form and context in which it appears.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING INFORMATION

This news release contains forward-looking statements and forward-looking information within the meaning of applicable Australian securities laws, which are based on expectations, estimates and projections as of the date of this news release.

This forward-looking information includes, or may be based upon, without limitation, estimates, forecasts and statements as to management's expectations with respect to, among other things, the timing and ability to complete the Ardea spin-out, the timing and amount of funding required to execute the Company's exploration, development and business plans, capital and exploration expenditures, the effect on the Company of any changes to existing legislation or policy, government regulation of mining operations, the length of time required to obtain permits, certifications and approvals, the success of exploration, development and mining activities, the geology of the Company's properties, environmental risks, the availability of labour, the focus of the Company in the future, demand and market outlook for precious metals and the prices thereof, progress in development of mineral properties, the Company's ability to raise funding privately or on a public market in the future, the Company's future growth, results of operations, performance, and business prospects and opportunities. Wherever possible, words such as "anticipate", "believe", "expect", "intend", "may" and similar expressions have been used to identify such forward-looking information. Forward-looking information is based on the opinions and estimates of management at the date the information is given, and on information available to management at such time. Forward-looking information involves significant risks, uncertainties, assumptions and other factors that could cause actual results, performance or achievements to differ materially from the results discussed or

implied in the forward-looking information. These factors, including, but not limited to, the ability to complete the Ardea spin-out on the basis of the proposed terms and timing or at all, fluctuations in currency markets, fluctuations in commodity prices, the ability of the Company to access sufficient capital on favourable terms or at all, changes in national and local government legislation, taxation, controls, regulations, political or economic developments in Australia or other countries in which the Company does business or may carry on business in the future, operational or technical difficulties in connection with exploration or development activities, employee relations, the speculative nature of mineral exploration and development, obtaining necessary licenses and permits, diminishing quantities and grades of mineral reserves, contests over title to properties, especially title to undeveloped properties, the inherent risks involved in the exploration and development of mineral properties, the uncertainties involved in interpreting drill results and other geological data, environmental hazards, industrial accidents, unusual or unexpected formations, pressures, cave-ins and flooding, limitations of insurance coverage and the possibility of project cost overruns or unanticipated costs and expenses, and should be considered carefully. Many of these uncertainties and contingencies can affect the Company's actual results and could cause actual results to differ materially from those expressed or implied in any forward-looking statements made by, or on behalf of, the Company. Prospective investors should not place undue reliance on any forward-looking information.

Although the forward-looking information contained in this news release is based upon what management believes, or believed at the time, to be reasonable assumptions, the Company cannot assure prospective purchasers that actual results will be consistent with such forward-looking information, as there may be other factors that cause results not to be as anticipated, estimated or intended, and neither the Company nor any other person assumes responsibility for the accuracy and completeness of any such forward-looking information. The Company does not undertake, and assumes no obligation, to update or revise any such forward-looking statements or forward-looking information contained herein to reflect new events or circumstances, except as may be required by law.

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

Appendix 1 – Definition of terms used

The KNP, the KNP Cobalt Zone and the Goongarrie Nickel Cobalt Project

With such a large portfolio of high-quality nickel and cobalt laterite deposits, the scale of Ardea's work programs can easily be underestimated.

The KNP comprises a series of nickel-cobalt camps, each containing several deposits. Definitions of some of the terms used in our announcements are as follows:

- **KNP (Kalgoorlie Nickel Project)**: contains all laterite deposits that have estimated nickel and cobalt resources. All deposits are located in the Eastern Goldfields of WA, within a radius of 100 km of each other.
- **KNP Cobalt Zone**: those deposits within the KNP with higher-grade cobalt contents. Nominally defined as greater than 0.08% cobalt, these are selectively reported resources from within the KNP. Some camps and groups of deposits that failed to meet this criterion are known to contain significant local cobalt mineralisation. These are part of a program of ongoing assessment aiming to further increase KNP Cobalt Zone resources.
- **Goongarrie Nickel Cobalt Project**: Ardea's prime future development project and the subject of the PFS, is focussing on the deposits of the Goongarrie Camp. Mining schedules defined in the PFS will focus on the cobalt-rich portions (the Cobalt Zone at Goongarrie) at Goongarrie South, Big Four, and Scotia Dam.

Table 3 – Tabulation and definition of Ardea's nickel and cobalt assets.

Laterite deposits		Nickel-cobalt resources		Future Development Projects
Camp	*Deposit(s)*	*KNP*	*KNP Cobalt Zone*	*Goongarrie Nickel Cobalt Project*
Goongarrie	Goongarrie Hill	✓		✓
	Goongarrie South	✓	✓	✓
	Big Four	✓	✓	✓
	Scotia Dam	✓	✓	✓
Menzies	Highway	✓		
	Ghost Rocks	✓		
Siberia	Black Range	✓	✓	
	Siberia South	✓		
	Siberia North	✓		
Bulong	Taurus	✓		
	Bulong East	✓		
Hampton	Kalpini	✓		
	Lake Rebecca	✓		
Yerilla	Aubils	✓	✓	
	Boyce Creek	✓		
	Jump Up Dam	✓		

As defined in the table above, the KNP Cobalt Zone comprises the following groups deposits:

- Goongarrie South, Big Four, and Scotia Dam (at Goongarrie).
- Black Range (at Siberia)
- Aubils (at Yerilla)

Each of the component deposits contains resources at various stages of refinement.

- At Goongarrie, detailed reassessment of resources for the PFS that has resulted in high-quality resources and revised resource reporting criteria in this announcement.
- At Black Range, nickel and cobalt resource estimates were updated by Ardea in August 2017 after drilling earlier in the year. Black Range also contains appreciable scandium and platinum group metal resources (announcement October 2017).
- Aubils at Yerilla comprises the least developed resource estimates within the KNP Cobalt Zone. This resource was last updated by Heron Resources in 2009 and has not undergone any reassessment by Ardea to date and provides further upside opportunity.

Ardea is seeking to define further resources that may be added to the KNP Cobalt Zone. Yerilla and Kalpini are broad areas that contain numerous known concentrations of cobalt and nickel mineralisation that, for various reasons such as insufficient drilling or simply overly broad grouping, need further reassessment. Of particular note is the Boyce Creek deposit at Yerilla where cobalt and nickel mineralisation is remarkably coherent, consistent, and shallow. Ardea has recently submitted a mining licence application over the deposit.

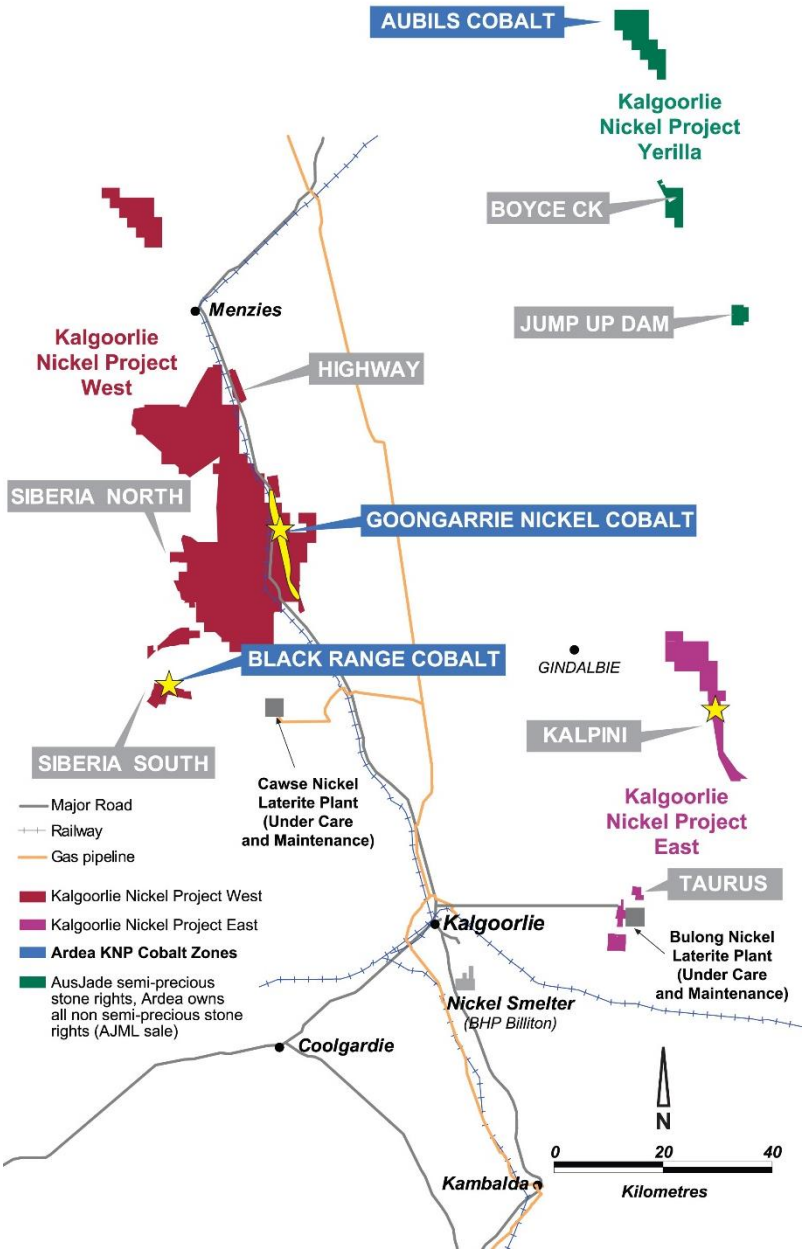

Figure 2 – Map of the KNP, showing the KNP Cobalt Zone with blue labels. Yellow strip marks the extent of the Goongarrie Nickel Cobalt Project. Yellow stars mark projects drilled by Ardea.

Appendix 2 – Further resource information

Updated global Goongarrie resource

A Global resource estimate presented for Goongarrie comprises the total encompassing resource that is defined using a nickel cut-off greater than or equal to 0.5% or cobalt cut-off greater than or equal to 0.08% within the combined nickel and cobalt zones modelled for Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill (as depicted within the combined nickel and cobalt zones for the Goongarrie South and Big Four deposits in Figure 1). The overall Goongarrie resource is **215.6 Mt at 0.06 % cobalt and 0.71 % nickel**, and includes over **130,000 t of contained cobalt metal**, and over **1,522,000 t contained nickel metal**. A full breakdown is provided in

Table 4 below. This resource includes all of the Cobalt Zone resource (Table 2 above) and additionally the greater tonnes of lower grade material outside of the Cobalt Zone.

This new global resource estimate incorporates the same groups of deposits as the Cobalt Zone resource (Goongarrie South, Big Four, and Scotia Dam), but also includes the nickel-rich Goongarrie Hill at the northern end of the Goongarrie Line. This new global resource represents a 14% increase in tonnage with minor increases in cobalt and nickel grade.

Although an overall resource for Goongarrie (as described above) has not been published previously, it can be back-calculated from overall KNP resources presented in the 2017 Annual Report. This new resource represents a 14% increase in tonnage with minor increases in cobalt and nickel grade.

The Goongarrie mineralisation includes as yet unestimated amounts of economically recoverable scandium and is not included.

Table 4 – Summary of total mineral resources within the Goongarrie Nickel Cobalt Project area, comprising resources at Goongarrie Hill, Goongarrie South, Big Four, and Scotia Dam.

Camp	Domains	Cut-off %	Resource category	Size (Mt)	Cobalt (%)	Nickel (%)	Contained metal Co (t)	Contained metal 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 3 – Summary of Information Required according to ASX Listing Rule 5.8.1

Goongarrie South and Big Four Mineral Resources

Geology and Geological Interpretation

The nickel laterite mineralisation within the KNP areas is developed from the weathering and near surface enrichment of Archaean-aged olivine-cumulate ultramafic units. The mineralisation is usually within 60 metres of surface and can be further subdivided on mineralogical and metallurgical characteristics into upper iron-rich material and lower magnesium-rich material based on the ratios of iron to magnesium. The deposits are analogous to many weathered ultramafic-hosted nickel-cobalt deposits both within Australia and world-wide.

The total strike length of the main Goongarrie South deposit is approximately 7,400 metres with observed widths across the deposit ranging from 400 and up to 1000 metres. Several semi-parallel zones of cobalt mineralisation are observed with variable thicknesses typically in the order of 5-20 metres thick with some zones being up to and exceeding 80 meters thick in the area referred to as the Pamela-Jean Zone. Interpreted mineralisation has been modelled from near topographic surface (378m RL) down to approximately the 220m RL (approximately 160m vertical from surface).

The total length of the modelled mineralised domains at Big Four is approximately 7,700 metres with observed widths of averaging approximately 300 metres. As with Goongarrie South, similar semi-parallel zones of cobalt mineralisation are evident with variable thicknesses typically in the order of 5-15 metres thick with some zones being in the range of 20 to 40 metres thick. Interpreted mineralisation has been modelled from near topographic surface (380mRL) down to approximately the 298m RL (approximately 80m vertical from surface).

The Scotia Dam deposit extends over a strike length of 1.4 km and ranges from 300m to 450m wide. The average thickness of the mineralisation is approximately 17m with the thickest mineralisation (up to 70m) occurring along a corridor of deep weathering along the eastern side of the deposit. Interpreted mineralisation has been modelled from near topographic surface (380m RL) down to approximately the 308m RL (approximately 70m vertical from surface).

The Goongarrie Hill deposit extends for 5km along strike and averages approximately 700m wide by 60m thick. The depth of weathering and hence the deposit thickness varies widely, but fresh rock is encountered from near surface to depths greater than 80m, with general weathering of olivine adcumulates averaging around 35 metres depth.

Drilling Techniques

The geology and nickel mineralisation within the Goongarrie Nickel Cobalt Project area has been delineated mostly with RC drilling accompanied by diamond drilling collecting PQ3 size core and sonic drilling collecting 5.1 inch diameter core for QAQC verification of the RC drill sampling and to provide samples for bulk density determinations and material for metallurgical testwork.

A staged series of drilling programs commencing in 1999 has generated a substantial drilling database for Goongarrie South initially comprising 897 RC drill holes for a total of > 48,600m completed between 1999

and 2001 followed by an additional 225 holes (11,880m) drilled by Vale/Inco from 2007 to 2008. A range of drill pattern densities have resulted ranging from 80mx160m or 80mx80m and down to 20mx20m in places. Vale/Inco also drilled 2 diamond holes for the purposes of carrying out beneficiation test work and QAQC verification of the twinned Heron RC holes as well as 30 sonic holes of which 4 were also used for QAQC verification of the results from previously drilled Heron RC holes.

At the Big Four Area, extensive RC drilling programs carried out by Heron during 1999, 2000, 2002, 2004 and 2006 account for approximately 88% of all drilling. The total RC drilling dataset is comprised of 496 RC drill holes for a total of 22,603m with 73 holes (2,661m) drilled by Anaconda in year 2000. Most of the RC holes have been drilled on a 80mE by 80mN grid. Six (6) diamond PQ sized holes at Big Four and two at Scotia Dam were also drilled by Vale / Inco (2008) to help confirm the geology and grades shown from the RC sampling and also to collect samples for metallurgical test-work.

The majority of the RC drilling at Scotia Dam comprising 100 holes (4,386m) was completed by Heron in 1999 and 2000 on an 80mE by 80mN grid spacing.

RC drilling at Goongarrie Hill has been completed in four campaigns with Heron completing 334 holes (12,860m) in 1999-2000, 2002 and 2006 and Vale completing a further 320 holes (15,105m) in 2008. The resultant drill spacing is 80mE along drill sections mostly alternating between 40m and 120m apart. Ten PQ3 size diamond holes and 25 sonic holes were also completed by Vale between 2006 and 2008.

Drill hole collars were surveyed using an RTK DGPS system with either a 3 or 7 digit level of accuracy. The coordinates are stored in the project exploration databases referenced to the MGA Zone 51 Datum GDA94. All drill holes are vertical and designed to optimally intersect the sub-horizontal mineralisation.

Sampling and Sub-sampling

Collection of bulk drill samples from all RC drilling completed at Goongarrie South, Goongarrie Hill, Big Four and Scotia Dam has been completed over 1m downhole intervals by both Heron and Inco/Vale using face sampling hammer bits (4 ½ and 5 ¼ inches) to maximise sample recovery.

Subsamples of all 1m intervals from the Heron RC drilling completed in 1999 to 2002 were collected using a riffle splitter when dry or damp, or by spear or scoop from the 1m bulk sample bag when wet. Composite spear/scoop samples for initial assay analysis were also collected, typically over 8m downhole intervals in unmineralised overburden or 4m intervals over mineralised material. The 1m sub-samples over the composite sample intervals that returned assays greater than 0.4% Ni were subsequently submitted for analysis with the resultant assays superseding the initial composite sample assays in the project database. This sampling methodology applies to most of the data used to inform the resource estimates for the southern half of the Goongarrie South deposit, the northern half of the Big Four deposit, most of the Scotia Dam deposit.

Subsamples from the Heron 2004 and 2006 RC drilling at Big Four and Goongarrie Hill were mostly collected over 2m downhole intervals using a cone splitter when dry or spear sampling when wet. Similarly, subsamples from the Vale RC drilling at Goongarrie South and Goongarrie Hill were mostly collected over 1m intervals using a cone splitter when dry or spear sampling when wet.

Resource grade estimation is informed only with sampling from the RC drilling.

Target RC subsample weights were between 2 and 3kg. In the case of wet clay samples, the samples were collected in poly-weave bags and allowed to settle and de-water to facilitate spear samples taken

from sample return pile. Wet samples were stored separately from other samples in plastic/poly-weave bags and riffle split if sufficiently dry.

DD holes were drilled for the purposes of:

- Verification of the geology and sampling determined from the RC drilling;
- Collection of bulk density measurements;
- Collection of material for metallurgical test work.

All DD holes were drilled collecting PQ3 size core. Holes not drilled for metallurgical purposes were whole core sampled to geological boundaries (approximately 1 metre) and assayed. Drill runs were reduced to as little as 0.5 metre in poor ground conditions to maximise core recovery. Core recovery was excellent averaging 90% at GS and 95% at BF and GH.

Heron inserted standards and/or duplicate RC sample splits into the exploration sample stream for external QAQC monitoring at a frequency of roughly 1 per drill hole for approximately 50% of the Heron RC drilling at GS, GH, BF and SD completed in 1999 to 2002. Standards, blanks and duplicate RC sample splits were inserted into the exploration sample stream on a cyclic 1 in 10 frequency (1 in 30 frequency for each type) for the remaining RC drilling completed by Heron at GH and BF in 2004 and 2006. Vale/Inco inserted both standards and duplicate RC sample splits into the exploration sample stream alternating on a 1 in 20 frequency.

Sample Analysis Method

Generally suitable sample preparation routines have been used by the primary laboratories conducting assay analyses of the samples from the GNCP area.

Subsamples from the Anaconda RC drilling at BF (12% of total used for BF resource estimation) were analysed by Ultra Trace Laboratories in Perth by a four acid disgest and ICP-OES finish for Ni, Co, MgO, FeO, Al2O3, CaO, Mn, Cr, Cu and Zn (3% of drilling), or fusion XRF analysis for same element suite plus SiO2 (9% of drilling).

Subsamples from most of the RC drilling (Heron) at GS and GH (79% and 73%, respectively) and 36% of the drilling at BF were analysed by KAL Labs in Kalgoorlie using the following analytical methods:

- Four acid digestion (4AD) with AAS finish for Ni, Co, MgO, FeO, Al2O3, CaO, Mn, Cr, Cu, and Zn (18% of drilling at GS, 10% at BF and 32% at GH).
- Four acid digestion (4AD) with ICP_OES finish for Ni, Co, MgO, FeO, Al2O3, Mn, Cr, Cu, and Zn (33% of drilling at GS, 23% at BF and 28% at GH).
- XRF analysis of pressed powder (PP) for Ni, Co, MgO, FeO, Al2O3, SiO2, CaO, Mn, Cr, Cu, and Zn (28% of drilling at GS, 3% at BF and 13% at GH).

Subsamples from the Vale RC drilling and the remaining Heron RC drilling used for resource estimation (21% at GS, 52% at BF and 27% at GH) were analysed for Ni, Co, MgO, FeO, Al2O3, SiO2, CaO, Mn, Cr, Cl, Cu, Zn and As by Ultra Trace using fusion XRF analysis. Most of the Vale/Inco samples have also been analysed for loss on ignition (LOI) by thermo-gravimetric analysis.

The fusion XRF method is widely accepted as the most preferred analytical method for multi-element analysis of nickel laterite samples. Thermo-gravimetric analysis is also the leading method used to determine LOI. The 4AD AAS and 4AD ICP-OES analytical methods are unable to test for SiO2 and the digestion method often does not fully attack all minerals which can lead to the understating of the true concentration of some elements particularly Al2O3 and Cr. The pressed powder XRF method is designed

to be semi-quantitative and typically suffers from poor analytical accuracy for elements that are poorly dispersed in the pressed powder pellet.

The precision and accuracy of the assay data for routine exploration samples from GS, GH, BF and SD were externally monitored by Heron and Vale by inserting samples of company analytical reference materials (standards) - (both companies) and duplicated RC sub-samples (Vale/Inco) into the exploration sample stream.

The following umpire assay programmes have also been completed:

- Representative sample pulps from RC drilling GS, GH, BF and SD covering the three analytical methods used at KAL labs were submitted for umpire assay at Ultra Trace using Fusion XRF analysis at approximately 1 in 50 frequency (Heron umpire programme)
- Amdel fusion XRF umpire analyses of Ultra Trace lab pulps (1 in 50) from the Heron 2004 drilling programme at BF (Heron umpire programme).
- Bureau Veritas Fusion XRF assays of pulps from early Heron RC drilling for holes at an 80m spacing along sections 400m apart. This provided umpire assays for 1911 RC samples originally analysed by KAL labs using 4 acid digest ICP-OES and 687 RC samples originally analysed by KAL labs using pressed powder XRF methods (Ardea umpire programme).

Statistical analyses of all the QAQC datasets has concluded the following:

- Reasonable levels of overall precision and accuracy have been achieved for all the Ni and Co assay data (KAL and Ultra Trace) as well as the Ultra Trace fusion XRF assays for the other analytes, although there is evidence that the KAL pressed powder XRF assays between 0.025% and 0.1% Co are biased approximately 8% low relative to the umpire assays.
- Various average levels of relative bias are evident in the KAL 4 acid digest ICP-OES assays compared to the umpire assays for the other analytes including MgO (5% low), FeO (7% low for assays > 16% Fe), Al2O3 (4% to 14% low), Mn (5% high), Cr (23% to 37% low).
- Various average levels of relative bias are evident in the KAL pressed powder XRF assays compared to the umpire assays for the other analytes including MgO (32% low to 12% high), Al2O3 (12% low for assays >1% Al2O3), SiO2 (9% low), CaO (8% to 22% high), Mn (locally 10% low), Cr (12% to 22% low).

The reliability of RC sampling which forms the majority basis of the source data used for resource estimation has been checked by collecting the following verification sample datasets:

- Routine duplicate RC sub-samples and associated multi-element fusion XRF assay data (Ultra Trace Laboratories) for the Vale/Inco drilling and the Heron RC drilling programmes completed at BF and GH in 2004 and 2006.
- Heron twinning of seven Heron RC holes with PQ3 diamond drill holes and multi-element analysis of duplicate splits of 1m half core samples by two labs using 4 acid digest ICP-OES and pressed powder XRF techniques (Kalgoorlie Assay Laboratories - KAL), and 4 acid digest ICP-OES and fusion XRF techniques (Ultra Trace Laboratories).
- Vale twinning of previous Heron RC holes with PQ3 diamond drill holes including two at GS, six at BF, two at SD and seven at GH, and analysis of half core samples at Ultra Trace by Fusion XRF.
- Vale twinning of three Vale RC holes and one Heron RC hole at GS and eight Vale RC holes at GH with 6 inch sonic drill holes, and analysis of half core samples at Ultra Trace by Fusion XRF.

- Vale collection of RC sample resplits (Jones riffle) from bulk sample residues from the RC holes twinned with PQ3 holes at BF, and analysis of the resplit samples by Ultra Trace using Fusion XRF.

The results of the twin hole data comparisons can be summarised as follows:

- Comparative statistics of the assay data for the Vale/Inco duplicate RC samples indicated that acceptable overall levels of precision were achieved for the important grade attributes.
- The grades (for various elements) are generally much more similar in the twin holes that are located closer together (Vale) compared to those that are located further apart (Heron). As such, the chemical variability of the mineralisation over short distances is considered to have a significant influence on the grade differences in the twin drill holes.
- Comparative grade profile plots show that the grades for most of the elements can range from being very similar to extremely different over compared down hole intervals, with some differences resulting from down hole offsets in the grade peaks and troughs, and others where the tenor and thickness of the peaks and troughs diverge to varying levels of disparity.
- None of the twin drill hole pairs provide any proof of significant grade bias having occurred as the result of the drilling and/or sampling methods that have been used.
- Some of the grade differences between the Heron RC / diamond drill holes may result from using different analytical methods and labs for the RC versus core samples.

In summary, there is no evidence that the nickel or cobalt grades for the RC samples used for resource estimation are biased high or low relative to the grades for the core samples from the twin diamond and sonic drill holes that have been drilled for verification purposes.

Estimation Methodology

Ni, Co, MgO, FeO, Al2O3, CaO, Cr and Mn were estimated into 3-D block models of the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposits using Ordinary Kriged (OK). The Ardea resource update study has only involved re-estimation of Ni and Co grades within newly defined Ni and Co domains by HGMC (using MineSight® software), while estimates for the other grade variables were retained from the Heron 2009 resource models for GS, GH and BF and Snowden 2004 resource model for SD produced using Vulcan software.

3-D block models from the Heron 2009 and Snowden 2004 estimates which included sub-blocking were regularised to the parent block size for each deposit with 40mE x 40mN x 4mRL size blocks used for Goongarrie South and Big Four, 40mE x 40mN x 2mRL size blocks for Scotia Dam and 30mE x 60mN x 2mRL for Goongarrie Hill, in order to accommodate the whole block modelling system used in the MineSight block models. This process preserved all of the original domain coding and grade estimates completed in the earlier studies, along with original domain proportion data relating to sub-blocks within the source models which were migrated into the regularised models composed of blocks with dimensions noted above.

Updating of the models in MineSight involved adding of zone codes with an associated block percentage sub-division (1% precision) relating to the newly defined mineralised low and high grade cobalt domains (based on notional 0.05% Co and 0.1% Co cutoff grades) and high grade nickel domains defined (based on a 1.0%Ni cutoff grade) within the previously modelled overall nickel domains. Cobalt domains were coded using items ZON1 and a corresponding ZON1%. Similarly nickel domains were coded using a ZON2 item with a corresponding ZON2% block proportion coding item.

The two grade defined mineralisation domains for Ni and Co were geostatistically analysed and modelled separately including detailed statistical analysis of 2m composites of the Ni and Co assay data, globally within the modelled domains and further separated by area domains defined based on the local orientation of the mineralisation.

Additional internal domains relating to the high-iron, and high-MgO domains were retained from previous modelling and define the upper and lower portions of the mineralised weathering profile. These domains are usually separated by a sharp (although often geometrically complex) boundary.

The following general interpolation parameters at Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill were used: a minimum and maximum number of composites of 1 and 24; no sub-blocking or discretisation (all domains). An initial search pass was used for interpolation of grade into the blocks of each AREA domain. Any un-estimated blocks were filled using a large search if necessary. Blocks interpolated in these peripheral areas were generally classified as inferred and did not contribute to material accounting in the higher confidence measured or indicated categories. Hard boundaries were assigned between the cobalt (ZON1) and nickel (ZON2) domains.

A range of outlier grade restriction parameters were applied to all mineralised wireframes within given the area domains. The influence of extreme grade values was examined utilising top cutting analysis tools. (grade histograms, log probably plots and coefficients of variation).

Model validation for all four of the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposit block models was carried out graphically and statistically to ensure that the block model grades accurately represent the input drill hole data. Several validation methods were employed including: global mean comparison; visual comparison; trend plot comparison. The global mean comparison between drill composite grades and model grades within each of the mineralised zone wireframes shows that, globally, the estimates validate well within all well-informed domains for both deposits. Cross sections were viewed on-screen and showed a good comparison between the drill hole data and the block model grades. A volume comparison between the volume of the block model cells within each mineralised zone and the volume of the corresponding wireframe. The results of volume checking were as in previous models within acceptable limits.

Bulk densities were measured for the Goongarrie South area by downhole geophysical density logging and Archimedes type density measurement of drill core. Both the wet/dry and weight of recovered core methods included voids in the density assessment. Most of the mineralisation lies within the ‘clay’ material which has a dry density of between 1.30 and 1.33 t/m^3.

Resource Classification

The Resource model uses a classification scheme at both Goongarrie South, Big Four and Scotia Dam used the same standard approach and was based upon block additional available estimation parameters. These included Kriging Variance, number of composites in search ellipsoid and the composite distance to block centroid. These inputs were used to derive relative confidence levels or ‘quality of estimate index’ (QLTY item) within the block model) which has a range of 1 to 3, where QLTY=1, 2 or 3 represents high, medium or low confidence respectively.

QLTY=1

- Drill spacing of 20x40 metre or less.
- Assays – Co only available for classification.
- Search ellipsoid distances 0-60m.

- Composite numbers 15 or greater.
- Kriging Variance 0 - 0.004. (Goongarrie South), and 0 - 0.005 (Big Four and Scotia Dam).

QLTY=2

- Drill spacing of 20x40 metre to 80x80 metre (depending on deposit and variography results).
- Assays – Co only available for classification.
- Search ellipsoid distances 60-100m.
- Composite numbers 10-15.
- Kriging Variance 0.004-0.008 (Goongarrie South), and 0.005-0.010 (Big Four and Scotia Dam)

QLTY=3

- Drill spacing greater 80x80 metre (depending on deposit and variography results).
- Assays – Co only available for classification.
- Search ellipsoid distances 100m or greater distances.
- Composite numbers 0 to 10.
- Kriging Variance 0.008 or greater (Goongarrie South), and 0.010 (Big Four and Scotia Dam).

These three QLTY item parameters were further condensed into an RCAT assignment item describing the confidence of the localized resource base in the block model. Preliminary Resource Classification Item coding was carried out as – (RCAT) Values 1-3 – (Nominally 'Measured', 'Indicated' and 'Inferred' [1, 2 or 3]. For Goongarrie South the QLTY=1 material is designated as Indicated Resources (RCAT=2) with the remaining QLTY = 2 and 3 material being combined and reporting as Inferred Resources. (RCAT=3). A Measured Resource at Goongarrie South is also defined within a small area within AREA domains 4 and 5 where high density drilling is present on a 20mEx40mN drilling grid.

For the Big Four and Scotia Dam areas, all QLTY=1 material is designated Indicated Resources (RCAT=2) with the remaining QLTY = 2 and 3 material being combined and designated as Inferred Resources. (RCAT=3).

At Goongarrie Hill all mineralized resources were designated as RCAT=3 (inferred) reflecting the particularly high degree of short range grade variability relative to the drill hole spacing compared to the other deposits.

Cut-off Grade

For both the Goongarrie South and Big Four deposit areas HGMC considers that all mineralized material within 100m vertical depth from surface will satisfy JORC modifying factors criteria relating to reasonable expectations that a part of the resource is likely to be exploitable at a given foreseeable future time. HGMC's opinion is that 0.08% Co or 0.5% Ni lower cut-off grades constitute adequate lower reporting cut-off for open cut pit exploitable cobalt mineral resources as required in consideration of the JORC Code which are likely to be exploited by open cut mining methods within a nominal 100m of topographic surface.

Mining and Metallurgical Methods and Parameters and other modifying factors

Open pit mining via conventional dig and haul with minimum blasting is assumed for all of the GNCP deposits. It is envisaged that smaller selective mining units will be employed in future resource model updates compared to the 40mx40mx4m blocks used to develop the current resource models, particularly as the result of further infill drilling of the deposits.

For the purposes of removing unlikely to be economic resources from the resource statement, Auralia Mining Consultants carried out a Whittle optimization for each of the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposits using an AUD$37,800 per tonne nickel and a AUD$241,500 per tonne cobalt price. Estimated Mining and processing costs, along with royalty and recovery factors were also updated by Auralia Mining Consultants for this process. The evaluation was carried out on the Kriged nickel and cobalt grades only and assumed; Pit slope = 55 degrees; Mining dilution = 10%; Mining recovery = 95%; Surface mining cost = $7:70 to $7:81; and Process recoveries of Co 94.5% - Ni 95.5%. The resultant pit shells were used to exclude a small proportion of the preliminary resources for material that would unlikely to ever be economically viable to mine.

The Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposits are subject to ongoing metallurgical studies. The current focus of studies into a preferred metallurgical approach is on high pressure acid leaching methods with a particular focus on improving the recovery of reagents during processing to improve unit costs.

Appendix 4 – JORC Code, 2012 Edition, Table 1 report

Section 1 Sampling Techniques and Data

(Criteria in this section applies to all succeeding sections)

Criteria	JORC Code explanation	Commentary

Sampling techniques
 	
Note: Due to the similarity of the deposit styles, procedures and estimations used this table represents the combined methods for all Ardea Resources (ARL) Cobalt and Nickel Laterite Resources. Where data not collected by ARL has been used in the resource calculations, variances in techniques are noted.
	• *Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.*
	• *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.*
	• *Aspects of the determination of mineralisation that are Material to the Public Report.*
	• *In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.*
		• The nickel and cobalt laterite resources at Goongarrie have been sampled dominantly using Reverse Circulation (RC) on various grid spacings from 10x10 metre and 80x160 metre spacing, with occasional diamond and sonic drilling (DD and SD) for QAQC verification of the RC drilling, collection of bulk density measurements and material for metallurgical testwork All holes were vertical and designed to optimally intersect the sub-horizontal mineralisation. RC drill samples were collected using a face sampling hammer over 1m intervals via cyclone into plastic bags when dry or polyweave bags when wet. Subsamples of significant mineralized material for routine assay analysis were collected by riffle or cone splitting when dry or damp or by spear when wet, over 1m or 2m intervals with the aim of collecting a 2-3kg sub-sample over each down hole sample interval.
		• Most of the sampling data used to inform the resource estimate is from RC drilling.
		• DD holes were drilled for the purposes of:
		  • Verification of geology and sampling determined from the RC drilling;
		  • collection of bulk density measurements;
		  • metallurgical test work.
		• Several large diameter (900 to 1200mm) bulk sample holes were completed at Goongarrie South and Goongarrie Hill using a Calweld well boring rig to collect material for metallurgical testwork.
		• Additional material for metallurgical test work, further verification of the RC drilling and collection of additional bulk density measurements was obatined by sonic drilling recovering 5.1 inch diameter core.
		• Most of the RC drilling informing the Mineral Resource estimates was completed by Heron Resources between 1999 and 2006 and Vale in 2007 and 2008 while most the diamond and sonic drilling was completed by Vale in 2006 to 2008 with the exception of 8 diamond holes completed by Heron at Goongarrie South in 2000.

Drilling techniques	• *Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• RC drilling was performed with a face sampling hammer (bit diameter between 4½ and 5 ¼ inches) and samples were collected via a cyclone into plastic bags when dry or polyweave bags when wet. • All diamond drilling used triple tube core barrels to collect PQ3 size core. • Calweld samples (not used in resource model but used for metallurgical testing) were collected in bulka bags on 1 metre down hole intervals. • Sonic drill samples were collected as whole core samples, 6 inches diameter of up to 1 metre lengths in sealed clear plastic wrap. Sonic core of longer lengths was split as it was retrieved from the drill string to facilitate handling of the heavy samples.
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• Recovery for the Heron RC bulk drill samples was based on visual estimates (%) while weights of the RC bulk drill samples were measured as a proxy for recovery for the Vale samples. The overall average RC sample recovery at Goongarrie is estimated to be 75% which is considered acceptable for nickel laterite deposits. • RC sample moisture content has also routinely been recorded with approximately 80% RC samples from Goongarrie South, 40% from Big Four and 10% from Goongarrie Hill from the Heron drilling logged as being wet, as compared to approximately 10% of the samples from the Vale RC drilling at GS and GH drilling logged as wet. Statistical analysis indicates that wet samples tend to report higher nickel grades at GS and BF where the water table is approximately 12m below surface. Plots of sample recovery versus grade also indicate a tendency for higher recoveries for samples

Criteria	JORC Code explanation	Commentary
		with higher Ni grades particularly for wet samples from the Heron RC drilling. While this does not demonstrate any clear evidence of grade bias resulting from RC drilling and sampling processes, it does highlight a need for routine verification of the RC drill samples and assay data with core drilling (diamond or sonic). • Measures taken to ensure maximum RC sample recoveries included maintaining a clean cyclone and drilling equipment, using water injection at times of reduced air circulation, as well as regular communication with the drillers and slowing drill advance rates when variable to poor ground conditions are encountered. • For diamond drilling, drill runs were reduced to as little as 0.5 metre in poor ground conditions to maximise core recovery. Core recovery was excellent being over 90% for all deposits. • Recovery from Sonic drilling was excellent with very good recoveries experienced in soft goethite clays where water injection was required in RC to facilitate acceptable recoveries. • In Calweld drilling, drill bit diameter was changed to account for ground hardness to maximise sample recovery and bore hole penetration. A specialized shoot was constructed to maximise the recovery from the drill head. Samples were stored in bulka bags to prevent contamination or sample loss.
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	• For RC drilling, visual geological logging was completed for all RC drilling on 1 metre intervals. The logging system was developed by Heron specifically for the KNP and was designed to facilitate future geo-metallurgical studies. Logging was performed at the time of drilling, and planned drill hole target lengths adjusted by the geologist during drilling. The geologist also oversaw all sampling and drilling practices. A mixture of Heron employees and contract geologists supervised all drilling. A small selection of representative chips were also collected for every 1 metre interval and stored in chip-trays for future reference. Only drilling contractors with previous nickel laterite experience and suitable rigs were used. • For DD holes, both visual geological and geotechnical logging were performed on all drill core. Core was also selectively sampled for both geological and metallurgical test work. • Calweld and Sonic holes were visually geologically logged prior to being sampled for metallurgical test work. • The geological legend used by Heron is a qualitative legend designed to capture the key physical and metallurgical features of the nickel laterite mineralisation. Logging captured the colour, regolith unit and mineralisation style, often accompanied by the logging of protolith, estimated percentage of free silica, texture, grain size and alteration. Logging correlated well with the geochemical algorithm developed by Heron for the Yerilla Nickel Project for material type prediction from multi-element assay data. • Drilling conducted by Vale / Inco was logged in similar detail to Heron's procedures, but used a slightly modified geological legend. There is a direct translation between the Vale /Inco and Heron logging legends.
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• Subsamples of all 1m intervals from the Heron RC drilling completed in 1999 to 2002 were collected using a riffle splitter when dry or damp, or spear or scoop from the 1m bulk sample bag when wet. Composite spear/scoop samples for initial assay analysis were also collected, typically over 8m downhole intervals in unmineralised overburden or 4m intervals over mineralised material. The 1m sub-samples over the composite sample intervals that returned assays greater than 0.4% Ni were subsequently submitted for analysis with the resultant assays superseding the initial composite sample assays in the project database. This sampling methodology applies to most of the data used to inform the resource estimates for the southern half of the Goongarrie South deposit, the northern half of the Big Four deposit, most of the Scotia Dam deposit. • Subsamples from the Heron 2004 and 2006 RC drilling at Big Four and Goongarrie Hill were mostly collected over 2m downhole intervals using a cone splitter when dry or spear sampling when wet. Similarly, subsamples from the Vale RC drilling at Goongarrie South and Goongarrie Hill were mostly collected over 1m intervals using a cone splitter when dry or spear sampling when wet. • Heron inserted standards and/or duplicate RC sample splits into the exploration sample stream for external QAQC monitoring at a frequency of roughly 1 per drill hole for approximately 50% of the Heron RC drilling at GS, GH, BF and SD completed in 1999 to 2002. Standards, blanks and duplicate RC sample splits were inserted into the exploration sample stream on a cyclic 1 in 10 frequency (1 in 30 frequency for each type) for the remaining RC drilling completed by Heron at GH and BF in 2004 and 2006. Vale/Inco inserted both standards and duplicate RC sample splits

Criteria	JORC Code explanation	Commentary
		• A small percentage of holes were separately resampled post drilling to confirm the integrity of the different sampling techniques employed. • One metre half core samples from the Heron and Ardea diamond drilling were cut using a diamond saw when hard or spatula when soft, and submitted for assay analysis along with blanks and standards for QAQC monitoring. Core from the Inco/Vale diamond holes was sampled over variable intervals (1-1.5m) with half core samples cut with a diamond saw and submitted for head assay along with blanks and standards, and the other half for beneficiation test work.

Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.*
	• *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.*
	• *Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.*
		• Subsamples from most of the RC drilling (Heron) at GS and GH (79% and 73%, respectively) and 36% of the drilling at BF were analysed by KAL Labs in Kalgoorlie using the following analytical methods:
		  ○ Four acid digestion (4AD) with AAS finish for Ni, Co, MgO, FeO, Al2O3, CaO, Mn, Cr, Cu, and Zn (18% of drilling at GS, 10% at BF and 32% at GH).
		  ○ Four acid digestion (4AD) with ICP_OES finish for Ni, Co, MgO, FeO, Al2O3, Mn, Cr, Cu, and Zn (33% of drilling at GS, 23% at BF and 28% at GH).
		  ○ XRF analysis of pressed powder (PP) for Ni, Co, MgO, FeO, Al2O3, SiO2, CaO, Mn, Cr, Cu, and Zn (28% of drilling at GS, 3% at BF and 13% at GH).
		• Subsamples from the Vale RC drilling and the remaining Heron RC drilling used for resource estimation (21% at GS, 52% at BF and 27% at GH) were analysed for Ni, Co, MgO, FeO, Al2O3, SiO2, CaO, Mn, Cr, Cl, Cu, Zn and As by Ultra Trace using fusion XRF analysis. Most of the Vale/Inco samples were also analysed for loss on ignition (LOI) by thermo-gravimetric analysis.
		• The fusion XRF method is widely accepted as the preferred analytical method for multi-element analysis of nickel laterite samples. Thermo-gravimetric analysis is also the leading method used to determine LOI. The 4AD AAS and 4AD ICP-OES analytical methods are unable to test for SiO2 and the digestion method often does not fully attack all minerals which can lead to the understating of the true concentration of some elements particularly Al2O3 and Cr. The pressed powder XRF method is designed to be semi-quantitative and typically suffers from poor analytical accuracy for elements that are poorly dispersed in the pressed powder pellet.
		• KAL Labs and Ultratrace routinely inserted analytical blanks, standards and duplicates into the client sample batches for laboratory QAQC performance monitoring.
		• Heron inserted standards and/or duplicate RC sample splits into the exploration sample stream for external QAQC monitoring at a frequency of roughly 1 per drill hole for approximately 50% of the Heron RC drilling at GS, GH, BF and SD completed in 1999 to 2002. Standards, blanks and duplicate RC sample splits were inserted into the exploration sample stream on a cyclic 1 in 10 frequency (1 in 30 frequency for each type) for the remaining RC drilling completed by Heron at GH and BF in 2004 and 2006. Vale/Inco inserted both standards and duplicate RC sample splits into the exploration sample stream alternating on a 1 in 20 frequency.
		• The following umpire assay programmes have also been completed:
		  ○ Representative sample pulps from RC drilling GS, GH, BF and SD covering the three analytical methods used at KAL labs were submitted for umpire assay at Ultra Trace using Fusion XRF analysis at approximately 1 in 50 frequency (Heron umpire programme).
		  ○ Amdel fusion XRF umpire analyses of Ultra Trace lab pulps (1 in 50) from the Heron 2004 drilling programme at BF (Heron umpire programme).
		  ○ Bureau Veritas Fusion XRF assays of pulps from early Heron RC drilling for holes at an 80m spacing along sections 400m apart. This provided umpire assays for 1911 RC samples originally analysed by KAL labs using 4 acid digest ICP-OES and 687 RC samples originally analysed by KAL labs using pressed powder XRF methods (Ardea umpire programme).
		• All of the QAQC data has been statistically assessed and the precision and accuracy of the assay data for the important grade components (Ni and Co) has been found to be acceptable and suitable for use in resource estimation.

Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.*	• The reliability of RC sampling which forms the majority basis of the source data used for resource estimation has been checked by collecting the following verification sample datasets:

Criteria	JORC Code explanation	Commentary
	• *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	○ Routine duplicate RC sub-samples and associated multi-element fusion XRF assay data (Ultra Trace Laboratories) for the Vale/Inco drilling and the Heron RC drilling programmes completed at BF and GH in 2004 and 2006. Comparative statistics of the assay data for the Vale/Inco duplicate RC samples indicated that acceptable overall levels of precision were achieved for nickel and cobalt. ○ Heron twinning of seven Heron RC holes at Goongarrie South with PQ3 diamond drill holes and multi-element analysis of duplicate splits of 1m half core samples by two labs using 4 acid digest ICP-OES and pressed powder XRF techniques (Kalgoorlie Assay Laboratories - KAL), and 4 acid digest ICP-OES and fusion XRF techniques (Ultra Trace Laboratories). ○ Vale twinning of previous Heron RC holes with PQ3 diamond drill holes including two at GS, six at BF, two at SD and seven at GH, and analysis of half core samples at Ultra Trace by Fusion XRF. ○ Vale twinning of three Vale RC holes and one Heron RC hole at GS and eight Vale RC holes at GH with 6 inch sonic drill holes, and analysis of half core samples at Ultra Trace by Fusion XRF. ○ Vale collection of RC sample resplits (Jones riffle) from bulk sample residues from the RC holes twinned with PQ3 holes at BF, and analysis of the resplit samples by Ultra Trace using Fusion XRF. • Two metre composites for the twinned RC and DD or Sonic hole pairs have been statistically compared and determined to have similar unbiased chemical compositions. Whilst there was some variability in the geology of the close spaced drill holes, the short range variance is typical of nickel laterite deposits in WA. • Where geology agreed within the twinned holes, assays were generally similar between the different methods. • Despite the evidence for grade differences in some of the twined holes related to the RC drilling process, overall, the RC drilling is still considered to provide samples that adequately represent the true geochemistry of the regolith which are suitable for the purpose of resource estimation. • No adjustments have been made to the assay data.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• The majority of the drill hole collars have been surveyed using an RTK DGPS system with either a 3 or 7 digit accuracy. The coordinates are stored in the exploration database referenced to the MGA Zone 51 Datum GDA94. • All of the exploration drill holes used for resource estimation are vertical and have not down hole surveyed. The sub-horizontal orientation of the mineralisation, combined with the soft nature of host material would result in minimal deviation of vertical RC drill holes. • The grid system for all models is GDA94. Where historic data or mine grid data has been used it has been transformed into GDA94 from its original source grid via the appropriate transformation. Both original and transformed data is stored in the digital database. • Survey control for modelling of the surface topography, which is essentially flat over the GS, BF and SD deposits is based on the drill hole collars. Minor errors are expected along the deposit margins (E-W) particularly in relation to a gentle rise immediately east of GS. The more elevated and variable surface topography at GH was generated based on drillhole collars supplemented by a 20mE by 20mN grid of points derived from photogrametry around the periphery of the deposit. While the current surface topography models are adequate for the current PFS mine planning processes, more detailed and expansive topographic data (LIDAR) will be required prior to undertaking detailed mine and infrastructure planning work as part of the upcoming DFS.
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• The drill spacing ranges from 20mE x 20mN to 80mE x 160mN at Goongarrie South, is mostly 80mE x 80mN at Big Four and Scotia Dam , and is mostly at 80 m intervals along east-west drill traverses alternating between 40m and 120m apart at Goongarrie Hill. Some localised regions of 40mE by 40mN and 20mE by 20mN spaced drilling are also present at Goongarerie Hill. • All assay data for the RC drilling was composited over 2m downhole intervals to match the most common longest sample interval through the mineralisation prior to resource estimation. • Studies of the spatial continuity of nickel and cobalt grades at the Goongarrie deposits have determined that the drill spacing is sufficient to defined Measured, Indicated and Inferred resources in the project area.

Criteria	JORC Code explanation	Commentary
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• The majority of the drill holes is vertical and give true width of the regolith layers and mineralisation. • On a local scale there is some variability due to sub-vertical to vertical structures which may not be picked up with the relatively broad spaced vertical drill pattern employed. This local variability is not considered to be significant for the project overall, but will have local effects on mining and scheduling later in the project life.
Sample security	• *The measures taken to ensure sample security.*	• All samples were collected and accounted for by Heron, Vale or Ardea employees during drilling. All samples were bagged into plastic bags and closed with cable ties. Samples were transported to Kalgoorlie from site by relevant employees in sealed bulka bags. • Consignments were transported to Ultratrace Laboratories in Perth by reputable commercial transport companies. All samples were transported with a manifest of sample numbers and a sample submission form containing laboratory instructions. Any discrepancies between sample submissions and samples received were routinely followed up and accounted for.

Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• Heron has periodically conducted internal reviews of sampling techniques relating to resultant exploration datasets, and larger scale reviews capturing the data from multiple drilling programmes within the KNP.
		• Internal reviews of the exploration data included the following:
		  • Unsurveyed drill hole collars (less than 1% of collars).
		  • Drill Holes with overlapping intervals (0%).
		  • Drill Holes with no logging data (less than 2% of holes).
		  • Sample logging intervals beyond end of hole depths (0%).
		  • Samples with no assay data (from 0 to <5% for any given project, usually
		• related to issues with sample recovery from difficult ground conditions,
		• mechanical issues with drill rig, damage to sample in transport or sample preparation).
		  • Assay grade ranges.
		  • Collar coordinate ranges
		  • Valid hole orientation data.
		• The Ultratrace Laboratory was visited by Heron staff in 2006, and the laboratory processes and procedures were reviewed at this time and determined to be robust.
		• The exploration data for the Siberia and Goongarrie Regions were initially reviewed in detail were by Heron in 2004 and subsequently by Vale / Inco in 2005

Section 2 - Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	• All Mineral Resources reported in this report occur within tenement holdings 100% owned by Ardea Resources.
Exploration done by	• *Acknowledgment and appraisal of exploration by other parties.*	• The Goongarrie South and Scotia Dam deposits were discovered and explored by Heron Resources Limited.

Criteria	JORC Code explanation	Commentary
other parties		• Vale Inco completed a prefeasibility study on the KNP which included extensive drilling of the Goongarrie South, Goongarrie Hill and Big Four deposits relevant to the current updated resource reporting.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• The KNP nickel laterite mineralisation, including cobalt rich areas is developed from the weathering and near surface enrichment of Achaean-aged olivine-cumulate ultramafic units. The mineralisation is usually within 60 metres of surface and can be further sub divided on mineralogical and metallurgical characteristics into upper iron-rich material and lower magnesium-rich material based on the ratios of iron to magnesium. The deposits are analogous to many weathered ultramafic-hosted nickel-cobalt deposits both within Australia and world-wide. • Cobalt rich mineralisation is typically best developed in iron rich material in regions of deep weathering in close proximity to major shear zones or transfer shear structures and to a lesser extent as thin zones along the interface of ferruginous and saprolite boundaries at shallower depths proximal to shear structures. • The Cobalt Zone is associated with a distinctive geo-metallurgical type defined as "Clay Upper Pyrolusitic". Mineralogy is goethite, gibbsite and pyrolusite (strictly "asbolite" or "cobaltian wad"). The Cobalt Zones typically occur as sub-horizontal bodies at a palaeo-water table within the KNP (late stage supergene enrichment). This material is particularly well developed at Goongarrie South.

Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:*
	  • *easting and northing of the drill hole collar*
	  • *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar*
	  • *dip and azimuth of the hole*
	  • *down hole length and interception depth*
	  • *hole length.*
		• The drill hole data relating to the resource estimates reviewed in this study are all previously reported results. No new drilling has taken place since 2008 with the exception of four diamond drill holes completed by Ardea in 2017. Ongoing studies for these prospect areas are focused on the metallurgical characteristics of the mineralisation and development of new process technology.
		• Drill hole collar, geology and assay data for each prospect area investigated in this study are provided in the Vale Inco Pre-feasibility Study, 2009 and Heron Pre-feasibility Study Update, 2010.

Drill hole Information	• *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the* • *understanding of the report, the Competent Person should clearly explain why this is the case.*	• N/A
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• Most drill hole samples have been collected over 1m or 2m down hole intervals. Assay compositing completed for each deposit in preparation for statistical analysis and grade estimation was conducted using length weighted averaging of the input assay data by corresponding sample lengths. Typically a 2 compositing length was used aligned with the dominant sampling interval used for drill sample collection. • No metal equivalent calculations have been used in this assessment.
Relationship between mineralisation widths and intercept lengths	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* • *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').*	• The mineralisation of all Heron's nickel laterite resources has a strong global sub-horizontal orientation. All exploration drill holes focused on the nickel – cobalt laterite mineralisation at Goongarrie are vertical. • With the exception of local offsets due to slumping, all vertical drill holes intersect the mineralisation at approximately 90 degrees to its orientation. All down hole widths approximate true widths for vertical holes.
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• No new discoveries of nickel laterite mineralisation or cobalt rich areas are presented in this report.
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	• Not applicable to this report. All figures previously reported.

Criteria	JORC Code explanation	Commentary
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	• Not applicable to this report.
Further work	• *The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• Infill drilling of the areas of the Goongarrie Ni-Co Project most likely to be mined, as determined by the Ardea PFS has been planned and is underway in preparation for producing update resource estimates with higher confidence resource classification for input into the Definitive Feasibility Study for the project.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	• *Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* • *Data validation procedures used.*	• Heron, Vale and Ardea have employed robust procedures for the collection of and storage of sample data. This included auto-validation of sample data on entry, cross checking of sample batches between the laboratory and the database and regular auditing of samples during the exploration phase. • Sample numbers were both recorded manually and entered automatically. Discrepancies within batches (samples were batched on a daily basis) were field checked at the time of data entry, and resampled if errors could not be resolved after field inspection. • HGMC reviewed the set of Microsoft Access data of the drilling information compiled for the Goongarrie South, Big Four, Goongarrie Hill and Scotia Dam deposit areas which was extracted from. Ardea's in-house Microsoft Access database. The databases supplied and used were dated July 2015, August 2015 and most recently August 2016. This is the most recent version of the database available • Data validation procedures include digital validation of the database on entry (no acceptance of overlapping intervals, duplicate hole and sample ID, incorrect legend information, out of range assay results, incorrect pattern of QAQC in sampling stream, failed QAQC, missing assays, samples and geological logging). • At the time of resource modelling all data was visually checked on screen, and manually validated against field notes. All changes to the database were verified by field checks. • Ardea undertook a program of drill hole collar survey and validation. All drill holes were surveyed using DGPS with an established base station control in the vicinity of the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposit areas.
Site visits	• *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* • *If no site visits have been undertaken indicate why this is the case.*	• The Competent Person for Estimation and Reporting of Mineral Resources, Stephen Hyland of HGMC has conducted several visits to much of the Goongarrie general area prior to Heron and Ardea's involvement with the project area and is familiar with the regional and some of the local geology. The drilling, sampling and geological practices used for data collection were standardized for all deposits. RC drilling was generally effective, although there were some minor localised issues with sampling accuracy of wet puggy clays. Overall procedures were consistent and the results from the RC drilling were found to be valid based on comparisons with the result of verification diamond drilling. • The Competent Person for Sampling Techniques and Data, Ian Buchhorn, is a current employee of Heron Resources and has acquitted and visited all of the KNP prospect areas. • No comment can be made on the validity of historic work by Helix, WMC and Anaconda, except to say that infill drilling has broadly similar results to the historic data. Due diligence by Ian Buchhorn at the time of acquisition by Heron confirmed acceptable QAQC by the various vendors. • HGMC has carried out a general project and data review in April 2017.The review found that project development and management of data have been given appropriate attention. All of the previous drilling data and resource estimation work was also reviewed and found to be of a high standard
Geological interpretation	• *Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* • *Nature of the data used and of any assumptions made.* • *The effect, if any, of alternative interpretations on Mineral Resource estimation.* • *The use of geology in guiding and controlling Mineral Resource estimation.* • *The factors affecting continuity both of grade and geology.*	• There is a strong correlation between the geology of adjacent drill holes in all of the resources. There is also a strong global correlation between weathering profile, lithology and mineralisation intensity. On a local scale the changes in weathering profile is often discrete, but of a complex geometry. • A combination of geological logging and assay data has been used to sub divide the mineralisation into high-iron and high-magnesium mineralisation types, within a mineralised domain. High-carbonate domains have also been defined. High-silica domains were more problematic to define, and further work is required on developing this geo-metallurgical domain. • The continuity of mineralisation is strongly controlled by bed rock alteration and palaeo water flow within the ultramafic host units. Areas of deep fracturing and water movement within the bedrock typically had higher grade and more extensive mineralisation in the overlying regolith. In the proximity of geological contacts between the ultramafic hosts and surrounding mafic and felsic lithologies there is often a distinctive increase in grade and widths of mineralisation, including the

Criteria	JORC Code explanation	Commentary
		development of mineralisation along fracture planes in the adjacent felsic and mafic units. Where the host regolith overlies olivine adcumulate lithologies there is an increase in siliceous material and a loss of the high magnesium mineralisation horizon. In areas where the host ultramafic was altered to talc, or talc-carbonate lithologies there was no development of nickel mineralisation in the regolith. These areas typically formed along shears, and sheared contacts within the bedrock. • Two sets of Mineralisation domains for both nickel and cobalt ('high and low' grade') were developed using a combination observed geological logging information and assay data. • The mineralised envelopes for Goongarrie South, Big Four and Scotia Dam deposits were based on drill intercepts of nominally >0.05% Co or >0.10% Co and >0.50% Ni or >1.00% Ni using maximum of 2m (2 samples) internal dilution. At Goongarrie Hill mineralized envelopes were developed for 'low grade' >0.05% Co and >0.50% Ni domains only. The logged geology and the local cobalt and nickel percentage (>0.05%, or >0.10% Co and >0.50%, >1.00% Ni) were used as a guide for the wireframes. The mineralised zone wireframes were extrapolated to the edges of the drilling along and perpendicular to the strike to maintain geological consistency. • The majority of detailed logging of RC drill chips and diamond core logging information from drill programs completed during the years 1999 to 2008 was transferred to geological logging database and this has provided a robust control for geology and material type interpretation and resource wireframe generation. • All mineralised envelopes where aligned with the known interpreted mineralisation trend. No obvious fault systems were interpreted to off-set mineralisation trends however they are known to exist and future work is required to determine how significant these effects may be.
Dimensions	• *The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	• Resource dimensions vary between deposits. The total length of the main Goongarrie South nickel and cobalt mineralisation domains is approximately 7,400 metres with observed widths of approximately 400 and up to 1000 metres. Several semi-parallel mineralisation zones for the smaller cobalt domains are observed are with variable thicknesses typically ranging in the order of 5-20 metres thick with some zones being up to and exceeding 50 meters thick in the area referred to as the Pamela-Jean zone. Interpreted mineralisation has been modelled from near topographic surface (378mRL) down to approximately the 220m RL (approximately 160m vertical from surface). • The total length of the main Big Four deposit nickel and cobalt mineralisation domains is approximately 7,700 metres with observed widths of approximately 300 metres. In the cobalt domains, several semi-parallel mineralisation zones are observed with variable thicknesses typically in the order of 5-15 metres thick with some zones being in the range of 20 to 40 metres thick. Interpreted mineralisation has been modelled from near topographic surface (380mRL) down to approximately the 298m RL (approximately 80m vertical from surface). • The total length of the main Scotia Dam nickel and cobalt mineralisation domains is approximately 1,300 metres with observed widths of approximately 250 and up to 550 metres. Possibly two (2) cobalt mineralisation zones are observed with variable thicknesses typically in the order of 5-25 metres thick with some zones being up to and exceeding 35 meters thick towards the northern end of the main mineralized zone. Interpreted mineralisation has been modelled from near topographic surface (378mRL) down to approximately the 324m RL (approximately 55m vertical from surface). • At Goongarrie Hill, the nickel and cobalt mineralisation domains have an approximate strike length of 5200 metres and a width of 750 metres. The thinner cobalt mineralisation domains range in thickness from approximately 5-15 metres.

Estimation and modelling techniques	• *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.*
	• *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.*
	• *The assumptions made regarding recovery of by-products.*
	• *Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterisation).*
	• *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.*
		• The Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposits were Ordinary Kriged (OK), using variography of the domained Ni and Co shells for Ni % and Co%.
		• Deposits were estimated using MineSight® software.
		• Block sizes for the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill models based on drill spacing and deposit geometry are as follows
		  • 40 x 40 x 4 metre Goongarrie South
		  • 20 x 40 x 4 metre Big Four
		  • 40 x 40 x 2 metre Scotia Dam
		  • 30 x 60 x 2 metre Goongarrie Hill
		  • (Uniform Block Size – No Sub-Blocks)
		• All models used zone codes with an associated block percentage sub-division (1% precision) to maintain accurate volume

Criteria	JORC Code explanation	Commentary
	• *Any assumptions behind modelling of selective mining units.* • *Any assumptions about correlation between variables.* • *Description of how the geological interpretation was used to control the resource estimates.* • *Discussion of basis for using or not using grade cutting or capping.* • *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	reporting. Cobalt domains were coded using items ZON1 and a corresponding ZON1%. Similarly nickel domains were coded using a ZON2 item with a corresponding ZON2% block proportion coding item. • Ni and Co are the principal economic minerals. The Ni was not interpolated in the May 2017 resource model revision but has been updated as at January 2018. Ni and Co only were the items re-interpolated. Ardea is aware Fe has the potential to be an economic mineral under some processing options being assessed. MgO, FeO, Al2O3 and SiO2 are all important minerals in the classification of the different geo-metallurgical styles of mineralisation for both materials handling and metallurgic extraction processes. All have been retained from previous modelling of Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill and are incorporated into the current (January 2018) block models. • The domain boundary for mineralisation is the same for all deposits with a step change in nickel grades being modelled at the 0.05% Co and the 0.10% Co levels as well as the 0.50% Ni and the 1.00% Ni levels. • The two grade defined mineralisation domains for each on the Ni anc Co elements were geostatistically analysed and modelled separately. • Additional internal domains relating to the high-iron, and high-MgO domains were retained from previous modelling and define the upper and lower portions of the mineralised weathering profile. These domains are usually separated by a sharp (although often geometrically complex) geological boundary. (Note: for some deposits only one or other geochemical domain is present). Depending on results of the variography, the Co grades was modelled in conjunction with the ancillary and related element manganese within the cobalt wireframe shells. • The following general interpolation parameters at Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill were used: a minimum and maximum number of composites of 1 and 24; no sub-blocking or discretisation (all domains). • One search passes were used for interpolation of grade into the blocks of each AREA domain. Any un-estimated blocks were filled using a large search if necessary. Block interpolated in these peripheral areas were generally classified as inferred and did not contribute to material accounting in the higher confidence measured or indicated categories. Hard boundaries were assigned between the cobalt (ZON1) and nickel (ZON2) domains. • No detailed assumptions have been made with regard to modelling of selective mining units, except future mining is expected to be using standard excavator and truck methods. The block sized utilised is expected to be in line with the general mining method assumptions including the use of standardized excavator and haul truck mining approaches. • Refer to the Data Aggregation Methods criteria in Section 2 above. A range of outlier grade restriction was applied to all mineralised wireframes within given AREA domains. • The influence of extreme grade values was examined utilising top cutting analyst tools. (grade histograms, log probably plots and coefficients of variation). • Some non-assayed intervals are present in the database. These have been interpreted as non-mineralised intervals and assigned zero grade for the purposes of block grade estimation. In situations where non-mineralised intervals are included within broader mineralised intervals these non-mineralised intervals are assumed to be mineralized, but grade level unknown. Interpolation from available from appropriately proximal data permitted in the interpreted zones concerned. • Model validation for all four of the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposit block models was carried out graphically and statistically to ensure that the block model grades accurately represent the input drill hole data. A number of methods were employed to validate the block model including: global mean comparison; visual comparison; trend plot comparison. The global mean comparison between drill composite grades and model grades within each of the mineralised zone wireframes shows that, globally, the estimates validate well within all well-informed domains for both deposits. Cross sections were viewed on-screen and showed a good comparison between the drill hole data and the block model grades. A volume comparison between the volume of the block model cells within each mineralised zone and the volume of the corresponding wireframe. The results of volume checking were as in previous models within acceptable limits.
Moisture	• *Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	• All tonnages reported are dry tonnes for all models. Dry density was determined from drill core and down hole gamma for the Jump Up Dam, Scotia, Highway and Goongarrie deposits. This dry tonnage was applied to the other deposits on a material type basis (see Bulk Density for more details).
Cut-off parameters	• *The basis of the adopted cut-off grade(s) or quality parameters applied.*	• The 0.05% and 0.10% Co and the 0.50% and 1.00% Ni cut-offs used for the wireframe domains of each of the deposits

Criteria	JORC Code explanation	Commentary
		was based on two observed step changes in the probability distribution of the cobalt grades across the drill holes as well as general spatial distribution of those grades. Nickel cut-offs adopted for the 'high grade' and 'low grade' domains were similarly based but with some reference to relative expected economic cut-off levels. • Previous routine Mineral Resource reporting by Heron has used a 0.5%Ni cut-off grade applied to the resource block models. Additionally, a 0.08% Co reporting lower cut-off has been adopted for reporting cobalt resources. These cut-off levels are commonly used for resource reporting for typical Nickel Laterite deposits and are continued for the new series of January 2018 block models and reporting. • HGMC has produced block model grade shells using both a 0.08% Co and 0.50% Ni cut-off and a 'Quality of Estimate' and resource category parameter (RCAT) parameter which is used to provide constraints for updated Mineral Resource with emphasis on coding regions of continuous nickel and cobalt mineralisation. These cobalt rich areas are of particular interest to Ardea as a potential source cobalt-nickel-manganese feed-stocks for the lithium ion battery industry.
Mining factors or assumptions	• *Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is* • *always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining* • *methods, but the assumptions made regarding mining methods and* • *parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	• Open pit mining via conventional dig and haul with minimum blasting is assumed for all deposits. Given the lateral extent of the models the selective mining unit SMU is likely to be smaller than the 40mx40mx4m blocks used to develop the new Goongarrie South and Big Four block models for example. • For the purposes of removing unlikely to be economic resources from the resource statement, Auralia Mining Consultants carried out a Whittle optimization for each of the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposits using an AUD$37,800 per tonne nickel and a AUD$241,500 per tonne cobalt price. Estimated Mining and processing costs, along with royalty and recovery factors were also updated by Auralia Mining Consultants for this process. The evaluation was carried out on the Kriged nickel and cobalt grades only. • Pit slope assumed 55 degrees. Other assumptions: Mining dilution 10%; Mining recovery 95%; Surface mining cost $7:70 to $7:81; Process recovery Co 94.5% - Ni 95.5%.
Metallurgical factors or assumptions	• *The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining* • *reasonable prospects for eventual economic extraction to consider potential* • *metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should* • *be reported with an explanation of the basis of the metallurgical* • *assumptions made.*	• The KNP Projects including the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill deposits are subject to ongoing metallurgical studies. • The current focus of studies into a preferred metallurgical approach is on high pressure acid leaching methods with a particular focus on improving the recovery of reagents during processing to improve unit costs.
Environmental factors or assumptions	• *Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining* • *reasonable prospects for eventual economic extraction to consider the* • *potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	• It is expected that waste rock material will largely be disposed of inside previously completed pits during the life of mine. Tailings disposal will consist of a mixture of conventional tailings dams and disposal in mined out pits. As all of the material mined will be of an oxidized nature and as such there is not expected to any acid generating minerals in the waste rock material. The processed tailings will need to be neutralized or recovered from the tailings stream prior to disposal in waste storage facilities. The expected land forms at the conclusion of the project will be of similar profile to the current land forms. • Environmental studies for the project have been started with base line surveys for flora and fauna. However, as the final process route is currently subject to research, the final environmental plans are yet to be developed. It is reasonable, given the existing nickel laterite operations in WA, that all environmental issues can be resolved and it will be possible to mine the resources within current environmental guidelines.
Bulk density	• *Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of* • *the samples.* • *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* • *Discuss assumptions for bulk density estimates used in the evaluation process of the*	• Bulk densities were measured for Goongarrie South and Goongarrie Hill by downhole geophysical logging and Archimedes density measurements of drill core. Both methods account for voids in the density assessment and give similar dry bulk density results after oven drying of the bulk density samples and subtraction of the downhole moisture content from the geophysical density logging data. • In situ dry density was set to between 1.3 and 2.05/m3 in the resource block model for Goongarrie South, being average bulk density values based on the available bulk density data for Goongarrie South sub-divided material types. Most of the mineralisation lies within the 'clay' material which has a dry density of between 1.30 and 1.33t/m3. Densities were assigned to material based on the geochemical material classification scheme for each of the deposits.

Criteria	JORC Code explanation	Commentary
	different materials.	• As insufficient bulk densities measurements are available for Big Four and Scotia Dam, average densities subdivided by material types were therefore adopted from Goongarrie South. These are considered a valid application due to the similar distribution of mineralogy and material types at these deposits. Where samples or ancillary assays were not numerically sufficient for classification, the average density for clay material was applied (1.5 t/m3 for Scotia Dam mineralisation). HGMC has reviewed all previous bulk density assignment work and preserved this for use in the new block models.
Classification	• *The basis for the classification of the Mineral Resources into varying confidence categories.* • *Whether appropriate account has been taken of all relevant factors (i.e. relative confidence in tonnage/grade estimations, reliability of input data,* • *confidence in continuity of geology and metal values, quality, quantity and* • *distribution of the data).* • *Whether the result appropriately reflects the Competent Person's view of* • *the deposit.*	• Resource classification was approached in the same manner for the Goongarrie South, Big Four and Scotia Dam deposits and is based on a combination of drill hole spacing, the number of drill hole composites use to inform a block estimate, kriging variance and the ranges of mineralisation continuity (developed from variography studies). All these classification parameters were recorded during the ordinary kriging interpolation cobalt grades. These parameters were condensed into a 'Quality of Estimate' QLTY=1, 2 or 3) precursor reporting item. **QLTY=1** • Drill spacing of 20x40 metre or less. • Assays – Co only available for classification. • Search ellipsoid distances 0-60m. • Composite numbers 15 or greater numbers. • Kriging Variance 0 - 0.004. (Goongarrie South), and 0 - 0.005 (Big Four), **QLTY=2** • Drill spacing of 20x40 metre to 80x80 metre (depending on deposit and variography results). • Assays – Co only available for classification. • Search ellipsoid distances 60-100m. • Composite numbers 10-15. • Kriging Variance 0.004-0.008 (Goongarrie South), and 0.005-0.010 (Big Four), **QLTY=3** • Drill spacing of 20x40 metre to 80x80 metre (depending on deposit and variography results). • Assays – Co only available for classification. • Search ellipsoid distances 100m or greater distances. • Composite numbers o to 10. • Kriging Variance 0.008 or greater (Goongarrie South), and 0.010 (Big Four), **Classification – RCAT=1(Measured), 2(Indicated) & 3(Inferred)** • These three QLTY item parameters were further condensed into an RCAT assignment describing the confidence of the localized resource base in the block model. Preliminary Resource Classification Item – (RCAT) Values 1-3 – (Nominally 'Measured', 'Indicated' and 'Inferred' [1, 2 or 3] – For Goongarrie South QLTY=1 material is designated as Indicated Resources (RCAT=2) with the remaining QLTY = 2 and 3 material being combined and reporting as Inferred Resources. (RCAT=3). A Measured Resource at Goongarrie South is also defined within a small area within AREA domains 4 and 5 where high density drilling is present on a 20mEx40mN drilling grid. • For the Big Four and Scotia Dam areas, all QLTY=1 material is designated Indicated Resources (RCAT=2) with the remaining QLTY = 2 and 3 material being combined and designated as Inferred Resources. (RCAT=3). • At Goongarrie Hill all mineralized resources were designated as RCAT=3 (inferred) reflecting the particularly high degree of short range grade variability relative to the drill hole spacing compared to the other deposits.

Criteria	JORC Code explanation	Commentary
Audits or reviews	• *The results of any audits or reviews of Mineral Resource estimates.*	• The new resource estimates for Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill prepared by HGMC have been compared against the previous resource models prepared by Heron in 2009 and Snowden in 2004 (Scotia Dam only). All models have been reviewed by Ardea's Senior Resource Geologist and found to provide reasonable estimates aligned with the level of confidence applied to each model.
Discussion of relative accuracy/ confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure* • *deemed appropriate by the Competent Person. For example, the* • *application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* • *The statement should specify whether it relates to global or local estimates,* • *and, if local, state the relevant tonnages, which should be relevant to* • *technical and economic evaluation. Documentation should include assumptions made and the procedures used.* • *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	• The resource as reported from the Goongarrie South, Big Four, Scotia Dam and Goongarrie Hill block models provides robust global estimates of cobalt and nickel resources. The confidence in local estimates ranges from high in the regions of closer spaced drilling at GS to low at GH where there is much less continuity of grades.