



# Western Australia's new nickel-copper-PGE frontier

Gonneville Project – Investor and Analyst Site Tour

**2 AUGUST 2023**

ASX:CHN



# Forward looking statements and competent person(s) disclosure



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of planned metallurgical test work including results from other zones not tested yet, scaling up to commercial operations; changes in project parameters as plans continue to be refined; changes in exploration programs and study programs and budgets based upon the results and outcomes, successful completion of the strategic partnering process; changes in commodity prices; economic conditions; political and social risks, accidents, labour disputes and other risks of the mining industry; delays or difficulty in obtaining governmental approvals, necessary licences, permits or financing to undertake future mining development activities; changes to the regulatory framework within which Chalice operates or may in the future; movements in the share price of investments and the timing and proceeds realised on future disposals of investments as well as those factors detailed from time to time in the Company's interim and annual financial statements, all of which are filed and available for review on the ASX at [asx.com.au](http://asx.com.au). Although the Company has attempted to identify important factors that could cause actual actions, events or results to differ materially from those described in forward-looking statements, there may be other factors that cause actions, events or results not to be as anticipated, estimated or intended. There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Accordingly, readers should not place undue reliance on forward-looking statements.

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## Mineral Resources Reporting Requirements

As an Australian Company with securities quoted on the Australian Securities Exchange (ASX), Chalice is subject to Australian disclosure requirements and standards, including the requirements of the Corporations Act 2001 and the ASX.

Investors should note that it is a requirement of the ASX listing rules that the reporting of mineral resources in Australia is in accordance with the JORC Code and that Chalice's mineral resource estimates comply with the JORC Code. The requirements of JORC Code differ in certain material respects from the disclosure requirements of United States securities laws. The terms used in this announcement are as defined in the JORC Code. The definitions of these terms differ from the definitions of such terms for purposes of the disclosure requirements in the United States.

## Competent Persons Statement

The Information in this presentation that relates to previously reported exploration results are extracted from the following ASX announcements:

- "High-grade nickel-copper-palladium sulphide intersected at Julimar Project in WA", 23 March 2020
- "New Mineralised Zone Intersected at Dampier Target", 7 July 2022
- "Seismic identifies potential 1.6km extension of Gonneville", 6 September 2022
- "Major northern extension of Gonneville Intrusion confirmed", 19 October 2022
- "Outstanding wide high-grade intersections north of Gonneville", 23 November 2022
- "Promising new sulphide mineralisation at the Hooley Prospect", 8 December 2022
- "Julimar flowsheet development and scoping update", 13 December 2022
- "Further early-stage exploration success north of Gonneville", 3 May 2023
- "New wide high-grade zones in ~900m step-out drill hole", 31 July 2023

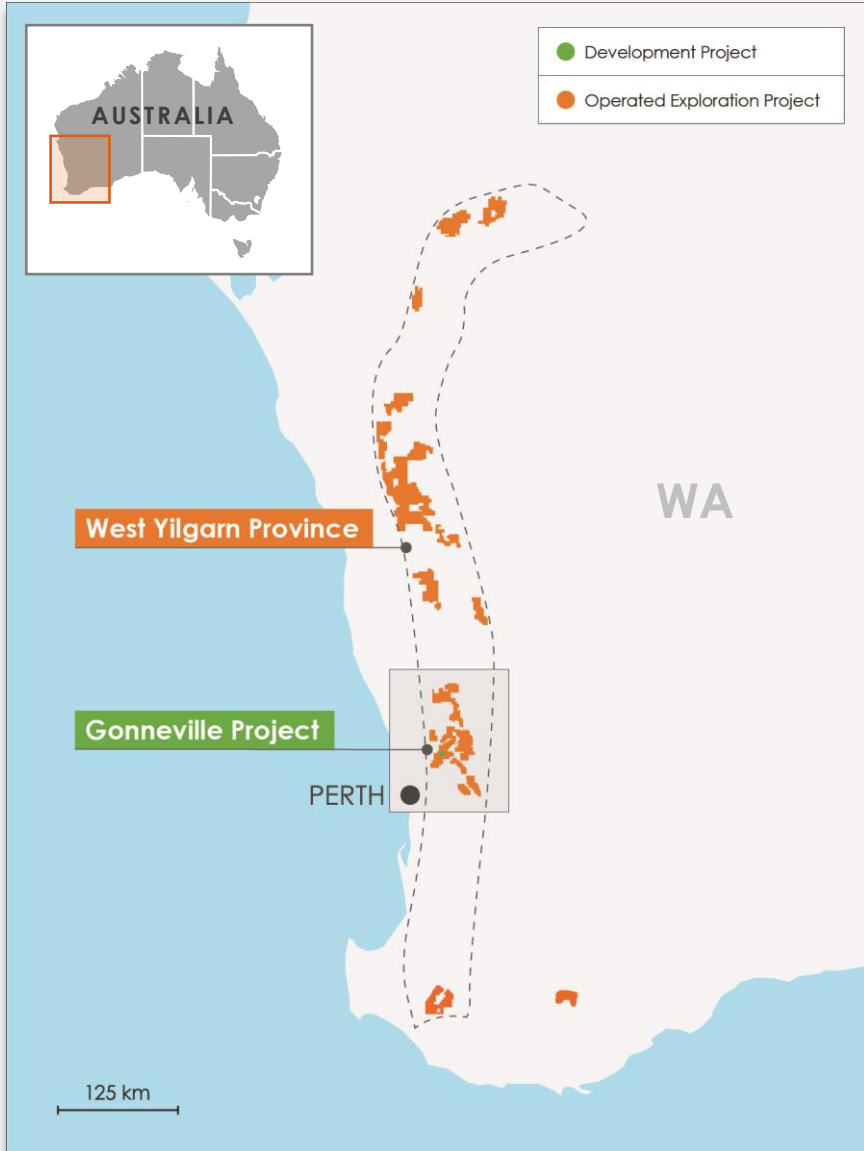
The information in this presentation that relates to Mineral Resources has been extracted from the ASX announcement titled:

- "Gonneville Resource increases by approx. 50% to 3Mt NiEq", 28 March 2023.

The above announcements are available to view on the Company's website at [chalicemining.com](http://chalicemining.com)

The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and, in the case of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the original release continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the relevant original market announcements. Refer to the attached Appendices for further information on the Mineral Resource Estimate and metal equivalents.

# Chalice is a leading **ASX200 green metals explorer-developer** with a track record of creating shareholder value



**Our purpose** – to find the metals needed to decarbonise the world (the green metals)

**Our aspiration** – to create a world class, multi-district *green metals* province in the West Yilgarn

## Who we are



**Globally recognised** name in minerals exploration following the Gonneville discovery in 2020



Team with a track record of **finding mines** and **rewarding shareholders**



**High-performance, results driven and values based company culture**

## Our portfolio



**Gonneville Ni-Cu-PGE Project** – Chalice is advancing a new world class *green metals* resource in Western Australia towards development



**West Yilgarn Ni-Cu-PGE Province** – Chalice is the first mover in one of the most exciting new nickel sulphide provinces worldwide

# Company Overview

## Our Achievements

- **~3,700% total return to shareholders** since Gonneville discovery in March 2020
- World class Gonneville Ni-Cu-PGE discovery recognised with PDAC **Thayer Lindsley Award** (2023) and AMEC **Prospector of the Year Award** (2022)
- Chalice recognised as RIU **Craig Oliver Award** (2021) MNN **Explorer of the Year** (2021) and D&D **Emerging Company of the Year** (2021)

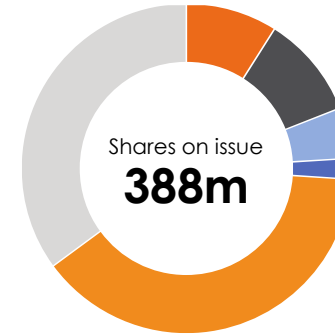
## Board of Directors

Derek La Ferla	Chairman
Alex Dorsch	Managing Director & Chief Executive Officer
Garret Dixon	Non-Executive Director
Stephen McIntosh	Non-Executive Director
Linda Kenyon	Non-Executive Director
Jo Gaines	Non-Executive Director

## Corporate snapshot – ASX:CHN

Market Capitalisation<sup>1</sup>  
~A\$2.3Bn

Cash balance<sup>2</sup>  
~A\$145m



## Top Shareholders<sup>3</sup>

Tim Goyder (Founder)	9%
Goldman Sachs	11%
BlackRock	5%
Directors & Mgmt.	2%
Other Institutions	37%
Retail & HNWI	36%

## Research coverage



J.P.Morgan Barrenjoey<sup>®</sup>

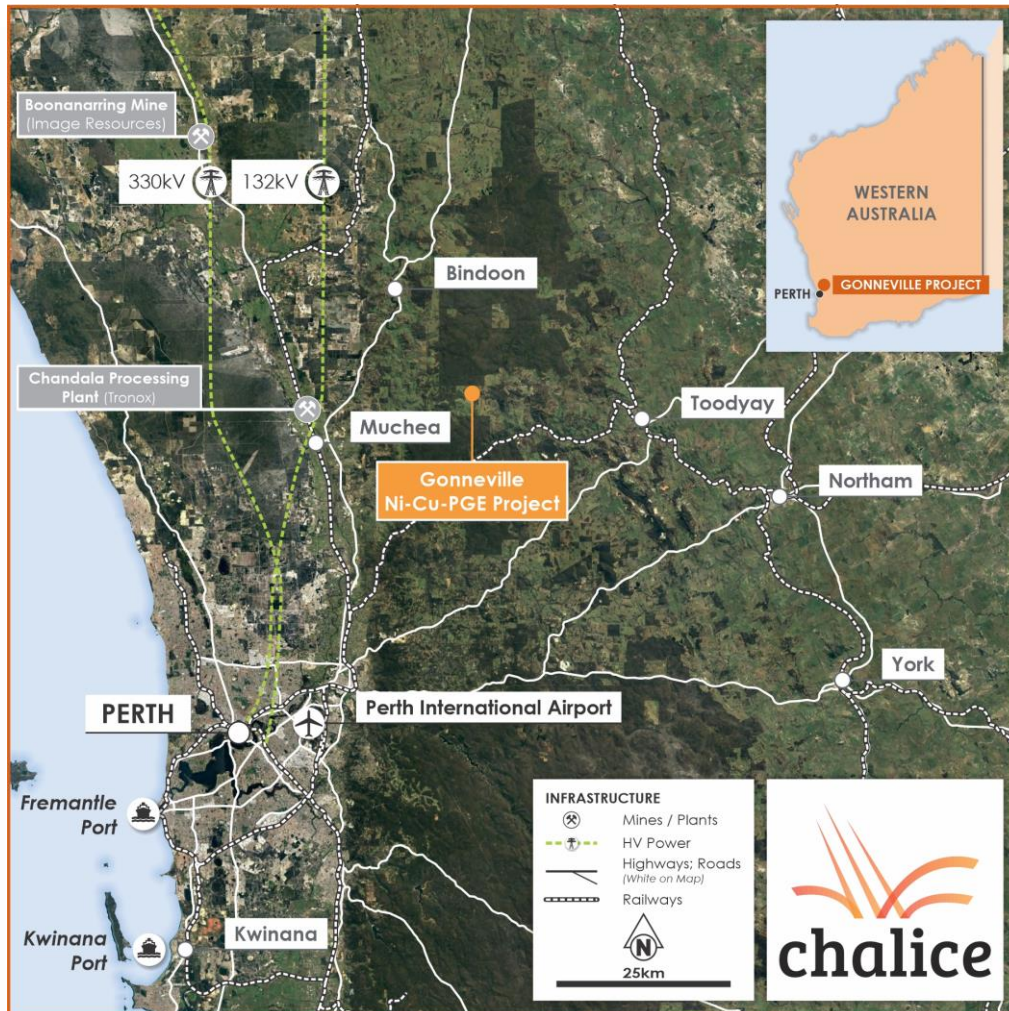


## Management

Alex Dorsch	Managing Director & Chief Executive Officer
Richard Hacker	General Manager – Strategy & Commercial
Dr Kevin Frost	General Manager – Discovery & Growth
Bruce Kendall	General Manager – Exploration
Dr Soolim Carney	General Manager – Environment & Community
Mike Nelson	General Manager – Project Development
Chris MacKinnon	Chief Financial Officer

<sup>1</sup> As of 28 July 2023; <sup>2</sup> As of 30 June 2023 <sup>3</sup> As of 30 June 2023. Substantial shareholder information is as disclosed in the last substantial shareholder notice provided to the Company. Note: Arctis Global disclosed a long equity derivative position of 46,728,282 shares on 10 Nov 2022.

# The **Gonneville Ni-Cu-PGE Project** – advancing a new world class green metals resource in Western Australia towards development



## A tier-1 scale magmatic sulphide Resource:

560Mt @ ~0.54% NiEq or ~1.7g/t PdEq<sup>1</sup> (~55% M&I / ~45% Inferred)

16Moz 3E<sup>2</sup>

860kt Ni

520kt Cu

83kt Co

contained

equivalent to ~3.0Mt NiEq or ~30Moz PdEq

Includes a higher-grade (>0.6% NiEq OP + UG) sulphide component:

120Mt @ ~0.9% NiEq or ~2.7g/t PdEq, extending from 30m to ~800m

High-grade mineralisation extends to depth of 1,100m and all zones remain open



A **strategic, large-scale** Resource with rare mix of critical minerals in sulphide mineralogy



Green metals at Gonneville are **essential for decarbonisation and urbanisation**



**100% owned**, located on **Chalice-owned farmland** in WA



**Significant upside** to the Resource and inherent **development optionality**



Direct access to **major highway, rail, power, port infrastructure** as well as **large Perth workforce**



**Strategy** to explore and develop in parallel; **formal strategic partnering process underway**

<sup>1</sup> Refer to full Mineral Resource Statement in Appendix <sup>2</sup> 3E = Palladium (Pd) + Platinum (Pt) + Gold (Au)

# Gonneville is positioned to become a **strategic asset** for Australia and the western world, given its rare palladium-nickel-cobalt content



Gonneville is the **first major PGE discovery in Australia** and one of the few recent large-scale magmatic Ni-Cu-PGE discoveries in the western world

**Pd, Pt, Ni and Co** are classified as **'critical minerals'** by most western governments; case is also growing for Cu

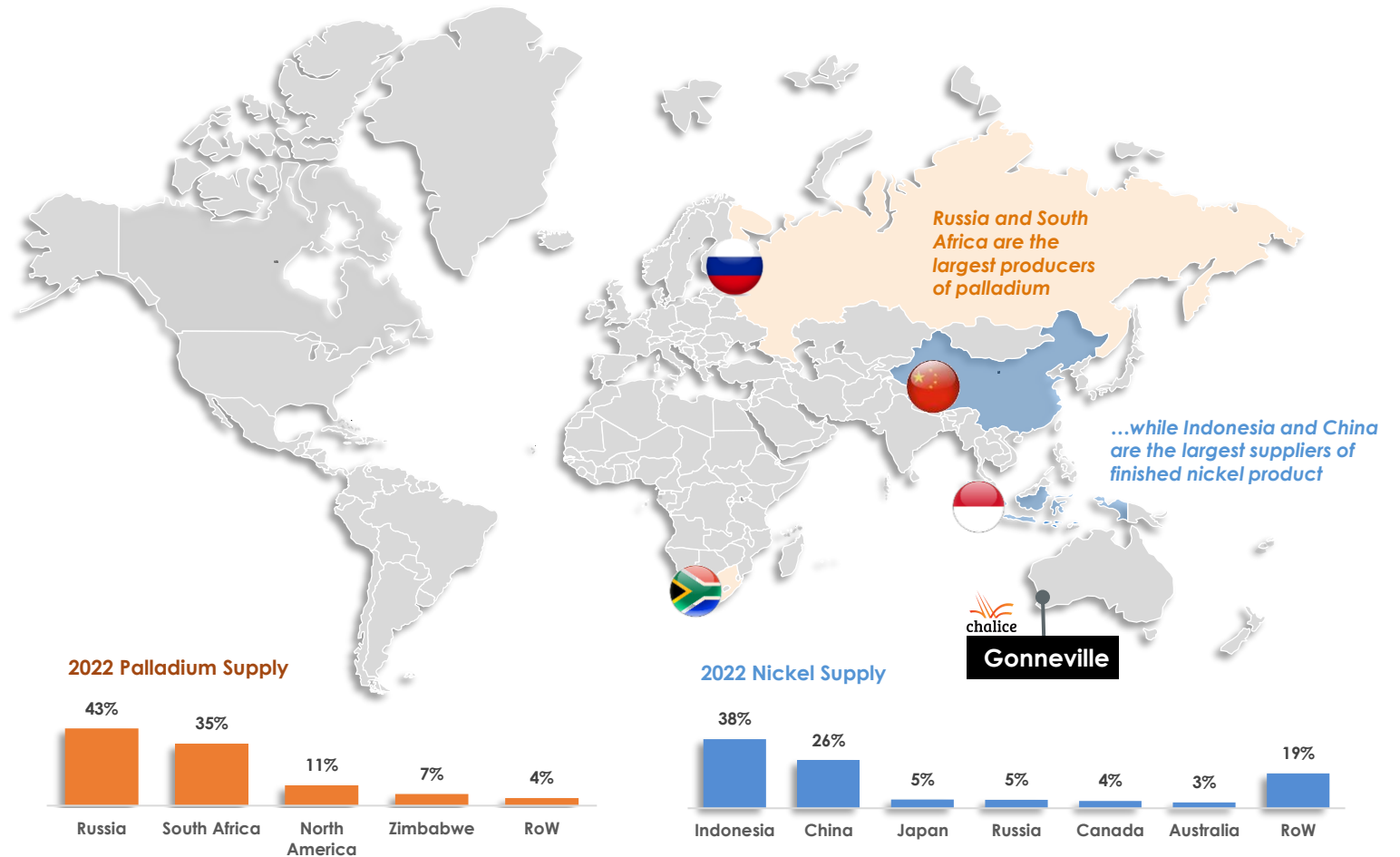
The western world is **extremely reliant** on **Russian Palladium supply** (~43% of global supply)

Gonneville is located in one of the **world's most stable and friendly mining jurisdictions** with a commitment to sustainable development

The Australian Government has committed >\$1 billion to **accelerate strategically significant projects** and **strengthen** internal critical mineral **security and supply chains**<sup>(1)</sup>

**Strategic partnering** process for Gonneville underway<sup>(2)</sup>, buoyed by the **US Inflation Reduction Act (IRA)**

**Global Palladium and Nickel Primary Supply Market Share (2022)<sup>3</sup>**

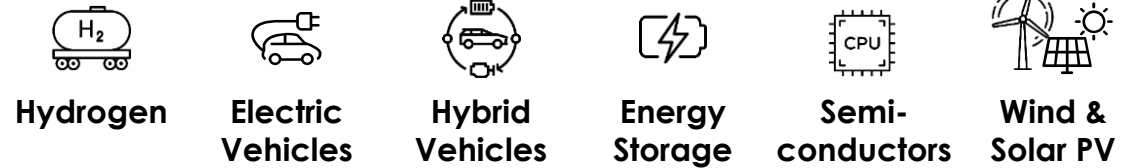


Source: 1 '2023-2030 Critical Minerals Strategy' Department of Industry, Science, Energy and Resources, Australian Government, June 2023

2 Discussions with potential partners are preliminary in nature, a formal partnering process is underway

3 AME as at 10 May 2023, Market research.

# The need to **decarbonise the global economy** will underpin long-term demand for the green metals at Gonneville



## Nickel and Cobalt

- Key industrial and electrification metals with unique chemical properties
- ~3Mt p.a. Ni market, supply dominated by carbon intensive, high environmental impact laterite sources, significant deficit forecast
- ~0.2Mt p.a. Co market, supply dominated by Democratic Republic of Congo with humanitarian challenges



## Copper

- Key industrial and electrification metal with high conductivity
- ~26Mt p.a. market, with severe lack of recent large-scale discoveries resulting in a significant deficit forecast



## Platinum and Palladium

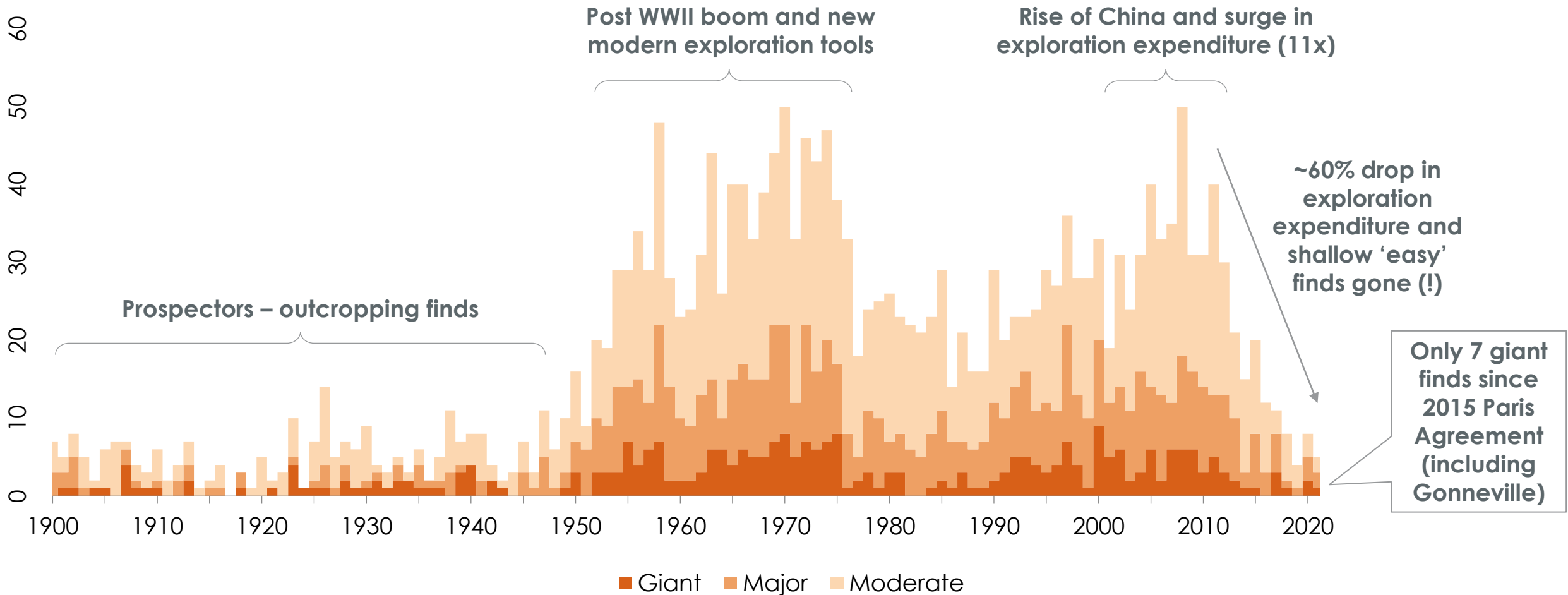
- Extremely rare (precious) metals with highly versatile catalytic properties, used in emissions reduction technologies such as catalytic converters and in hydrogen electrolyzers and fuel cells
- ~11Moz p.a. Pd market in prolonged deficit, supply dominated by Russia
- ~7Moz p.a. Pt market, supply dominated by South Africa



# The fate of decarbonisation rests on the explorers who must find the green metals – **big discoveries are very rare**



Number of base metal (Ni, Cu, Zn, Pb) discoveries in the World by size – 1900-2021



Source: MinEx Consulting © February 2023

Note: "Moderate" >10kt Ni, >100kt Cu, >300kt Zn+Pb; "Major" >100kt Ni, >1Mt Cu, >3Mt Zn+Pb; "Giant" >1Mt Ni, >5Mt Cu, >12Mt Zn+Pb.

Excludes unreported discoveries in recent years



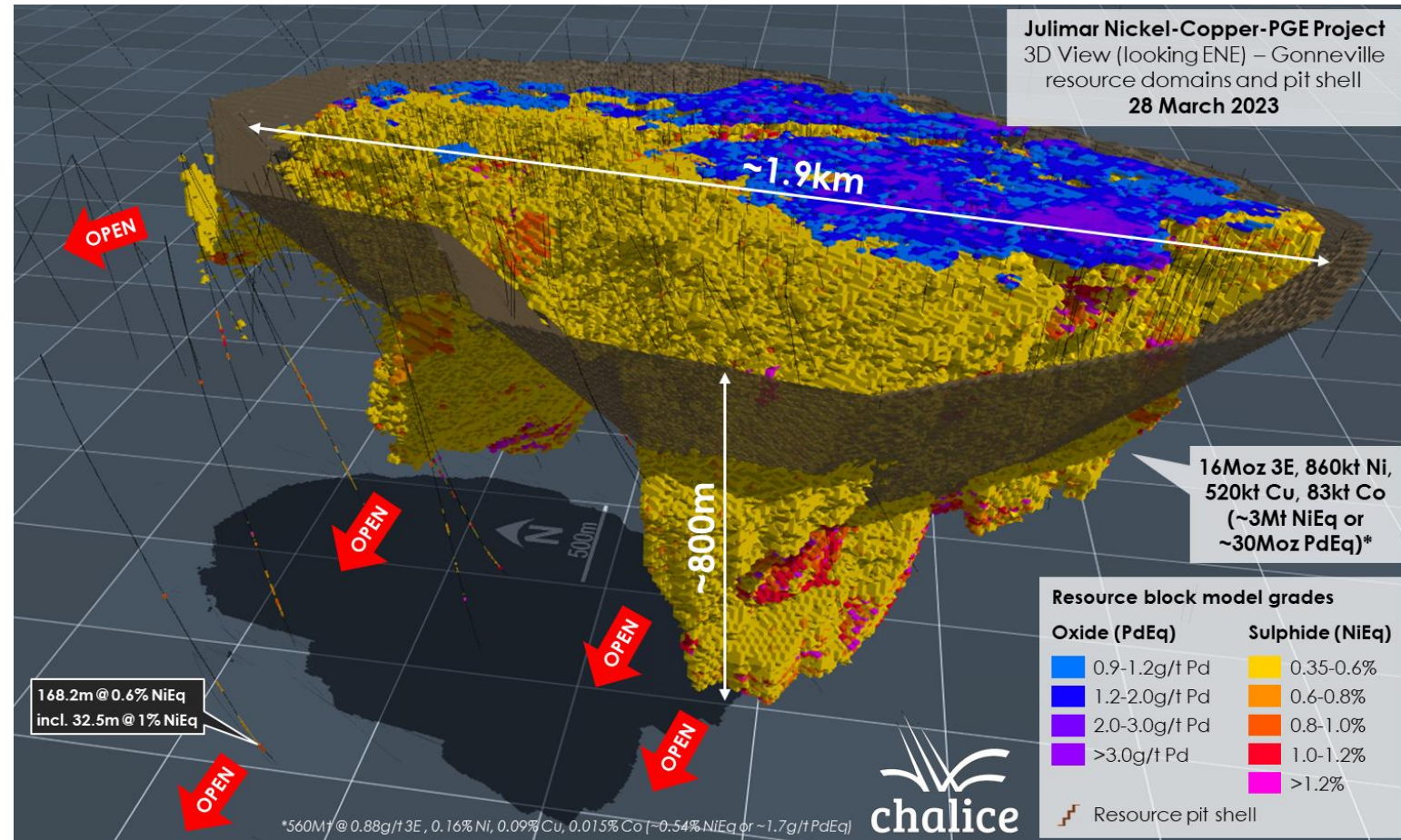
# The **rare, tier-1 scale** Gonneville Resource has **high-grade optionality** and **compelling growth potential**



## Mineral Resource Estimate<sup>1</sup>:

- **560Mt** @ 0.88g/t 3E, 0.16% Ni, 0.09% Cu, 0.015% Co (**~0.54% NiEq** or **~1.7g/t PdEq**)
- **16Moz 3E, 860kt Ni, 520kt Cu** and **83kt Co** (**~3.0Mt NiEq** or **~30Moz PdEq**) contained
- Resource is defined to depth of **~800m**, remains **open at depth**
- Located on **Chalice-owned farmland**
- Resource pit shell **~1.9km (s) x 1.4km (w) x ~600m (d)**
- Resource shell has **low strip ratio of 1.6**

## 3D view (looking ENE) of Gonneville Resource domains and pit shell

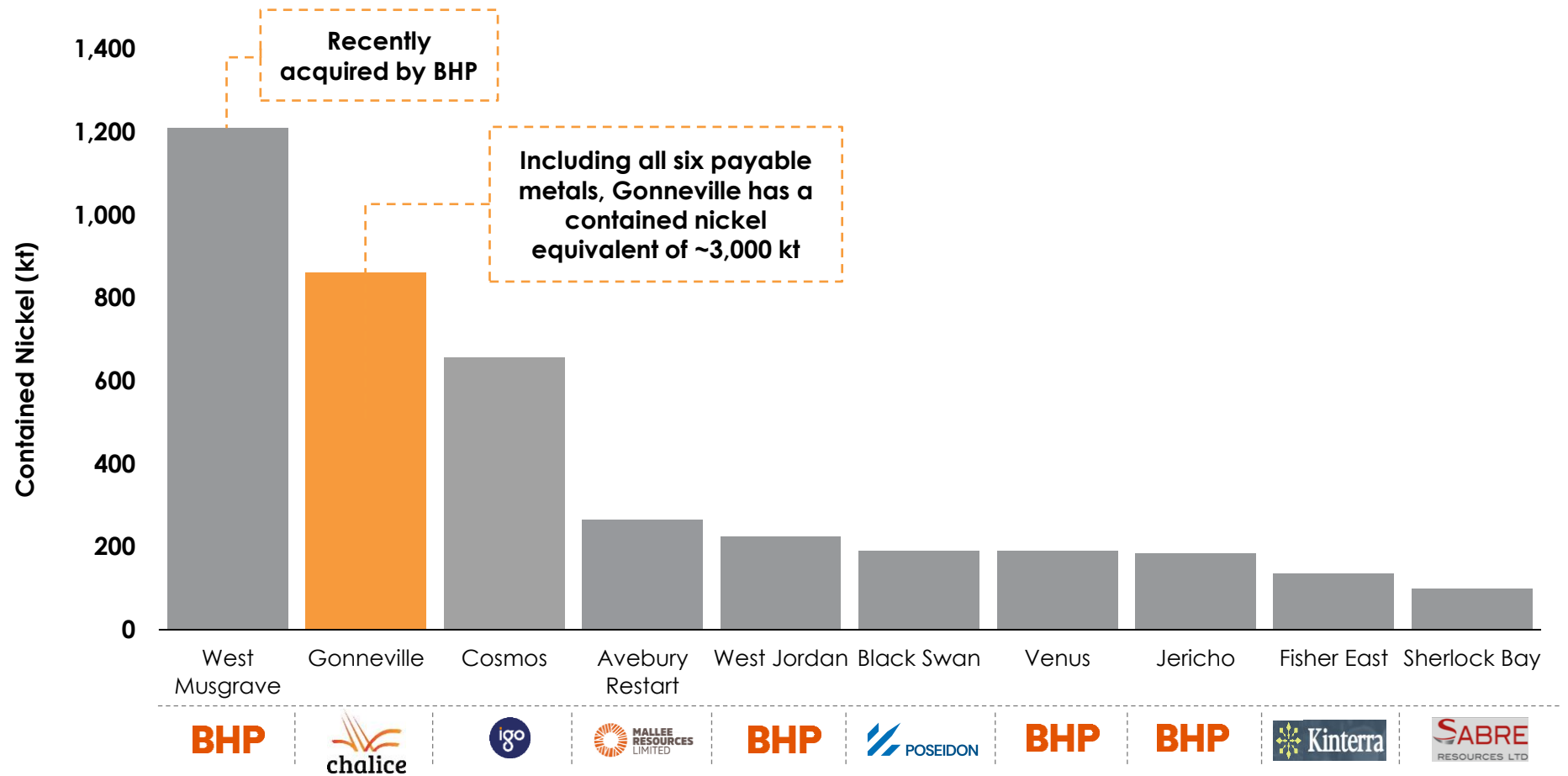


<sup>1</sup> Refer to full Mineral Resource Statement in the Appendix

Gonneville has the **second largest** undeveloped nickel sulphide resource in Australia and has significant PGE-Cu-Co credits



Australian primary nickel sulphide resources in exploration or development <sup>1</sup>



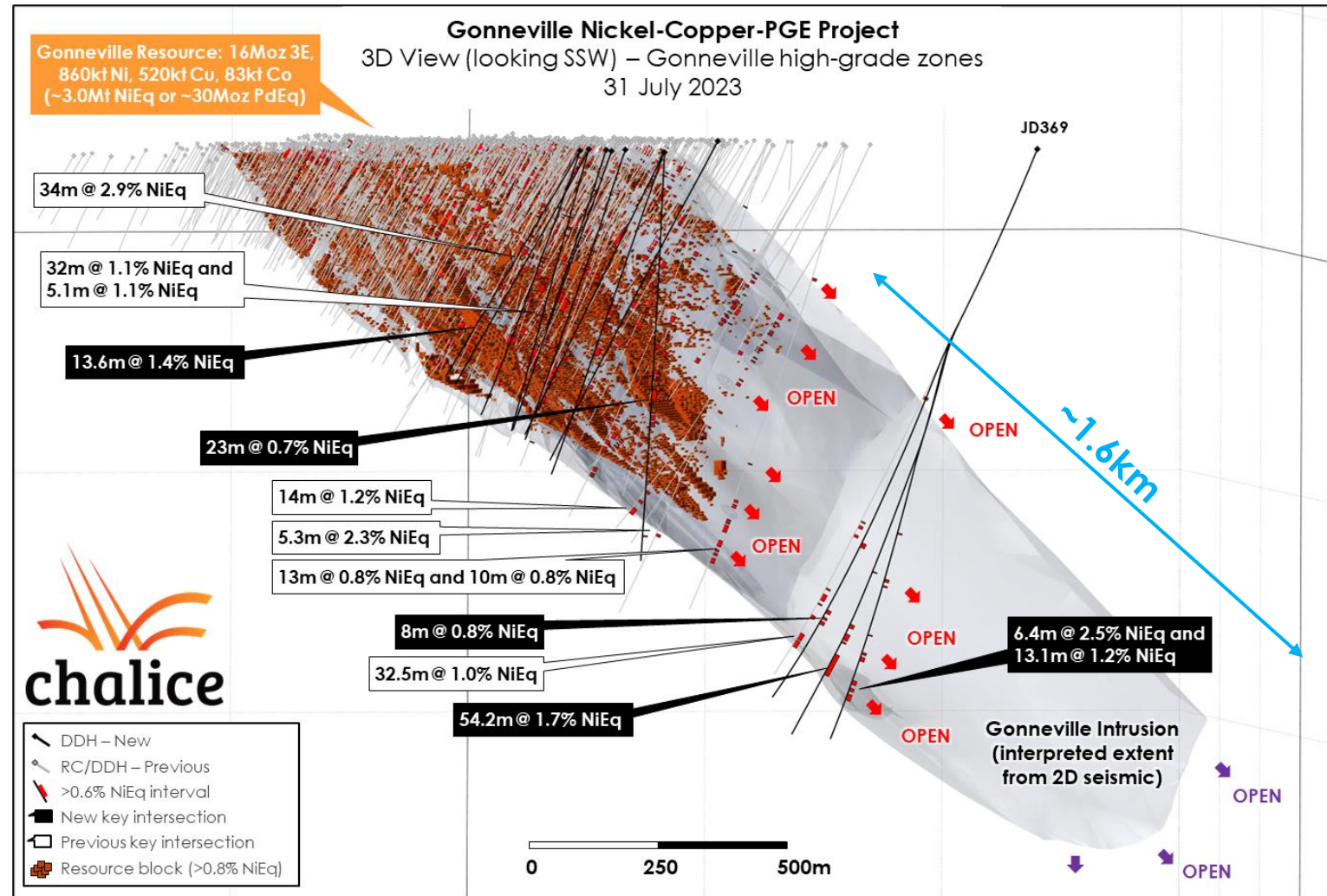
Source: Company filings.

1: Based on total reported JORC Resource (Measured, Indicated, and Inferred). Includes all exploration and development projects with a contained Ni resource of over 99kt. Please refer to Appendix [Australian Primary Nickel Sulphide Resources slide] for peer comparison information; [Gonneville Mineral Resource Estimate slide] and [Metal equivalent assumptions slide] for the assumptions used for the calculation of metal equivalents.

The Resource remains **open down-dip**, with ongoing drilling demonstrating potential for **material growth of the deposit** on farmland

- The **500-600m thick** Gonneville Intrusion is interpreted to extend a further **~1.6km down-dip** to the WNW beyond the Resource
- Recent step-out drilling has hit new high-grade Cu-PGE zones at depth:
  - **34m @ 7.0g/t 3E, 0.16% Ni, 0.63% Cu, 0.02% Co (2.9% NiEq)** from 432m
  - **54.2m @ 3.6g/t 3E, 0.21% Ni, 0.39% Cu, 0.02% Co (1.7% NiEq)** from 1132.8m
  - **6.4m @ 3.6g/t 3E, 0.36% Ni, 1.2% Cu, 0.02% Co (2.5% NiEq)** from 1188.6m.
- **Significant high-grade underground potential** emerging, well beyond the Resource pit shell
- **Early underground mining options** targeting high-grade zones from ~400m to 1,100m+, in parallel with open-pit mining, being investigated

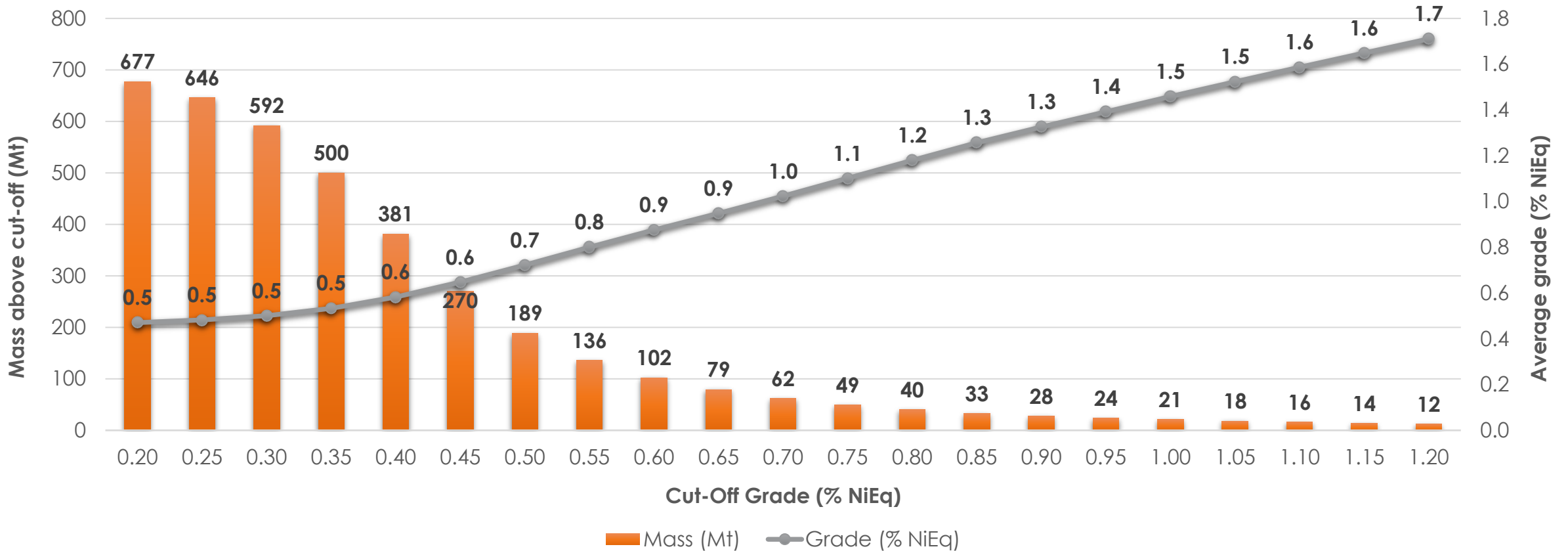
### 3D view (looking SSW) of Gonneville Intrusion, >0.8% NiEq Resource blocks and drilling



# The grade-tonnage curve highlights Gonneville's significant **development optionality and leverage to commodity prices**



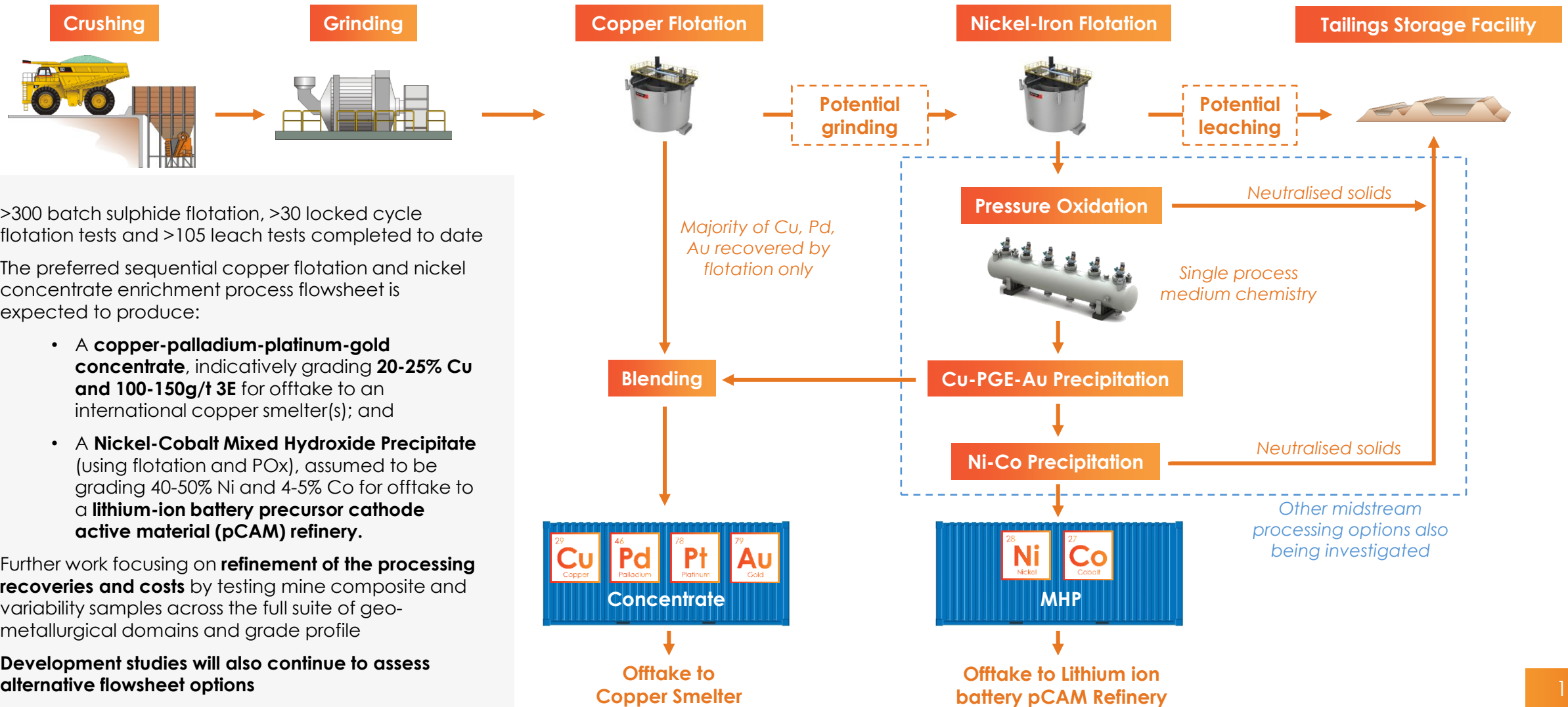
**Gonneville Nickel Equivalent Grade-Tonnage Curve in-pit (on NiEq cut-off grade basis)**



**Two open-pit development cases**, based on the March-2023 Resource, have now been selected for the Scoping Study, which is **targeted for completion in Q3 2023**

# The processing flowsheet envisaged is targeting production of a **Cu-PGE-Au concentrate** and a **battery-grade Ni-Co MHP**

## Gonneville Processing Flowsheet (simplified)



- >300 batch sulphide flotation, >30 locked cycle flotation tests and >105 leach tests completed to date
- The preferred sequential copper flotation and nickel concentrate enrichment process flowsheet is expected to produce:
  - A **copper-palladium-platinum-gold concentrate**, indicatively grading **20-25% Cu and 100-150g/t 3E** for offtake to an international copper smelter(s); and
  - A **Nickel-Cobalt Mixed Hydroxide Precipitate** (using flotation and POx), assumed to be grading 40-50% Ni and 4-5% Co for offtake to a **lithium-ion battery precursor cathode active material (pCAM) refinery**.
- Further work focusing on **refinement of the processing recoveries and costs** by testing mine composite and variability samples across the full suite of geo-metallurgical domains and grade profile
- **Development studies will also continue to assess alternative flowsheet options**

Chalice is committed to **strong environmental stewardship** and has a unique opportunity at Gonneville to demonstrate this



### Leading practice low-impact exploration

- Exploration in Forest strictly governed by a Conservation Management Plan, according to industry best practice
- Low impact track mounted rigs with a small footprint and no mechanised clearing of vegetation
- Flora, fauna and cultural heritage monitoring is conducted prior to each site mobilisation



### Science-based environmental management

- Comprehensive baseline environmental surveys across 6,000ha; covering flora, fauna, and dieback
- Baseline water studies underway; Chalice recognises water is a shared resource



### Environmental resilience

- Effectively managing biodiversity, rehabilitation and closure is part of our commitment to responsible mining and future operations



### Gonneville Project Biodiversity Goal

To ensure science-based **no net loss** of species or habitat diversity as a result of our operations

### Delivering the Biodiversity Strategy

**A detailed implementation plan will be developed over the coming 12 months**



#### Connectivity

Establish ecological corridors



#### Restoration

Implement restoration initiatives that address habitat fragmentation



#### Regeneration

Improve carbon sequestration



# The Gonneville Project has the potential to deliver **significant benefits for the local community and wider region**



Chalice has **engaged early, actively and transparently** to build respectful and collaborative relationships with stakeholders



Chalice is committed to achieving **lasting social and economic benefits** for the communities in which we operate



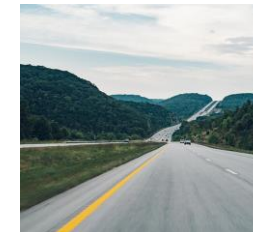
Gonneville could deliver significant **jobs, skills and economic diversification** to the Wheatbelt region of WA



**Distribution of information to our host communities** – Regular Community Newsletter, local advertising, information sheets and meetings



**~\$1.23M local procurement and investment contributed by Chalice, plus ~\$1.5M spend by direct contractors** in the local shires surrounding the Gonneville Project (FY22)



**Long-term major economic contribution for WA and nationally** direct boost to Australia's GDP, additional revenue through payroll taxation and mineral royalties



**Dedicated Gonneville Project Pop-Up Office** – A community hub for questions and information and an opportunity to engage direct with our team



Developing the framework for a future **Community Development Fund**, designed to deliver significant long term benefits to local communities



**Potential to create hundreds of new jobs for the Wheatbelt and outer-Perth**, plus boost adjacent sectors



**Prioritised local employment** with **~22%** of current workforce locally based near Gonneville (as at 30-June-22)



**Local Voices Community Survey**, a series of independent surveys to understand the priorities of the community. Results from the first survey received, providing an important input for future decision making and engagement



**Attractive semi-rural setting lifestyle or Drive-in-Drive-Out** commute, with increased real wages contributing directly to the regional economy

# Chalice is building **collaborative relationships** with Whadjuk and Yued Traditional Owners



## Actively engaging to protect cultural heritage values



### Our Commitment to Whadjuk and Yued Traditional Owners

Traditional Owners have unique rights and interests to those of other stakeholders. Chalice recognises their rights and respects their obligation to maintain culture, tradition and customs



### Collaboration with Yued and Whadjuk

Whadjuk and Yued have started a program of cultural heritage surveys and monitoring for the Gonneville Project. In the last year over **60 Traditional Owners have participated in this work**



### Heritage Agreements

Whadjuk, Yued and Chalice established heritage agreements in 2018 that set out how **we work together to protect and manage cultural heritage**



### South-West

### Settlement Agreement

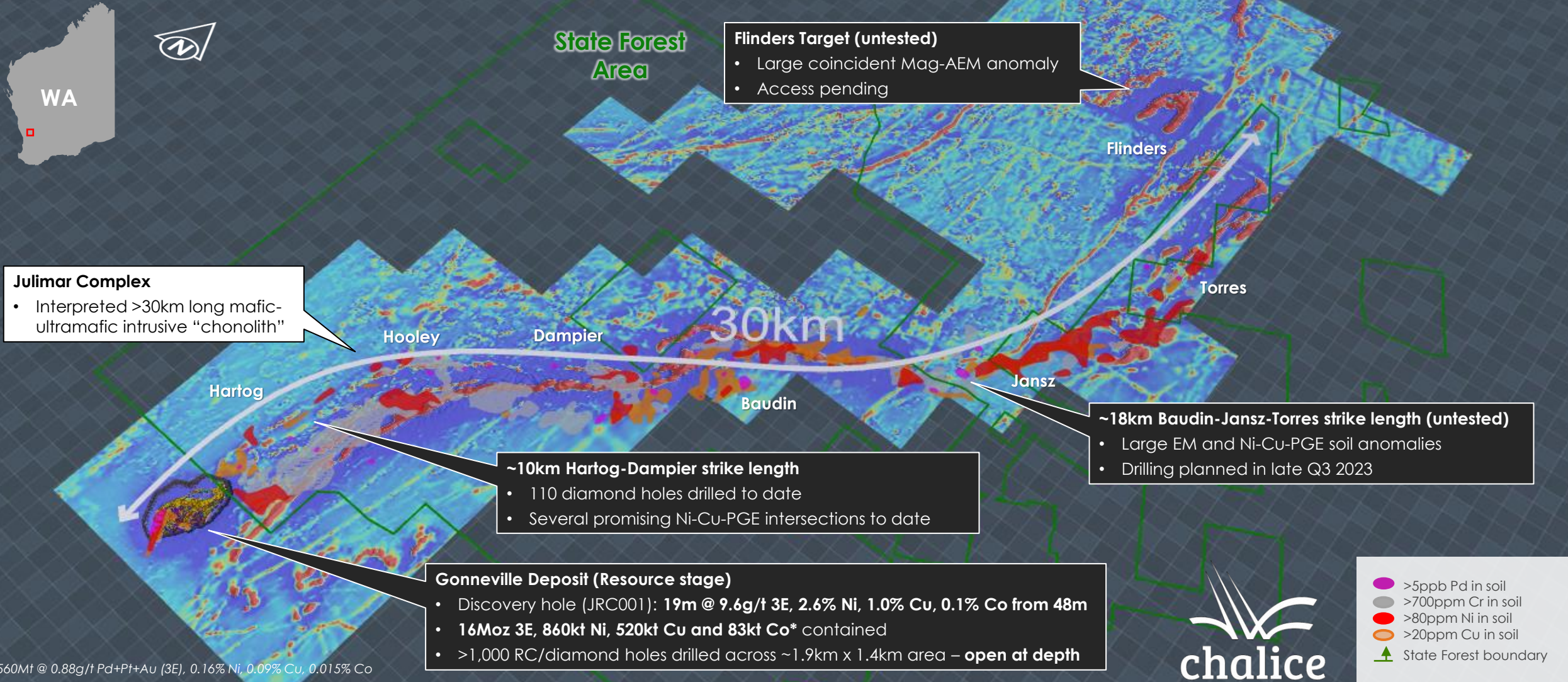
The **Whadjuk and Yued people are the Traditional Owners** of the lands of the Julimar region, which is subject to two Indigenous land use agreements with the State of Western Australia



# The current Resource occupies just ~2km of the >30km long Julimar Complex – Gonneville is a province opening play



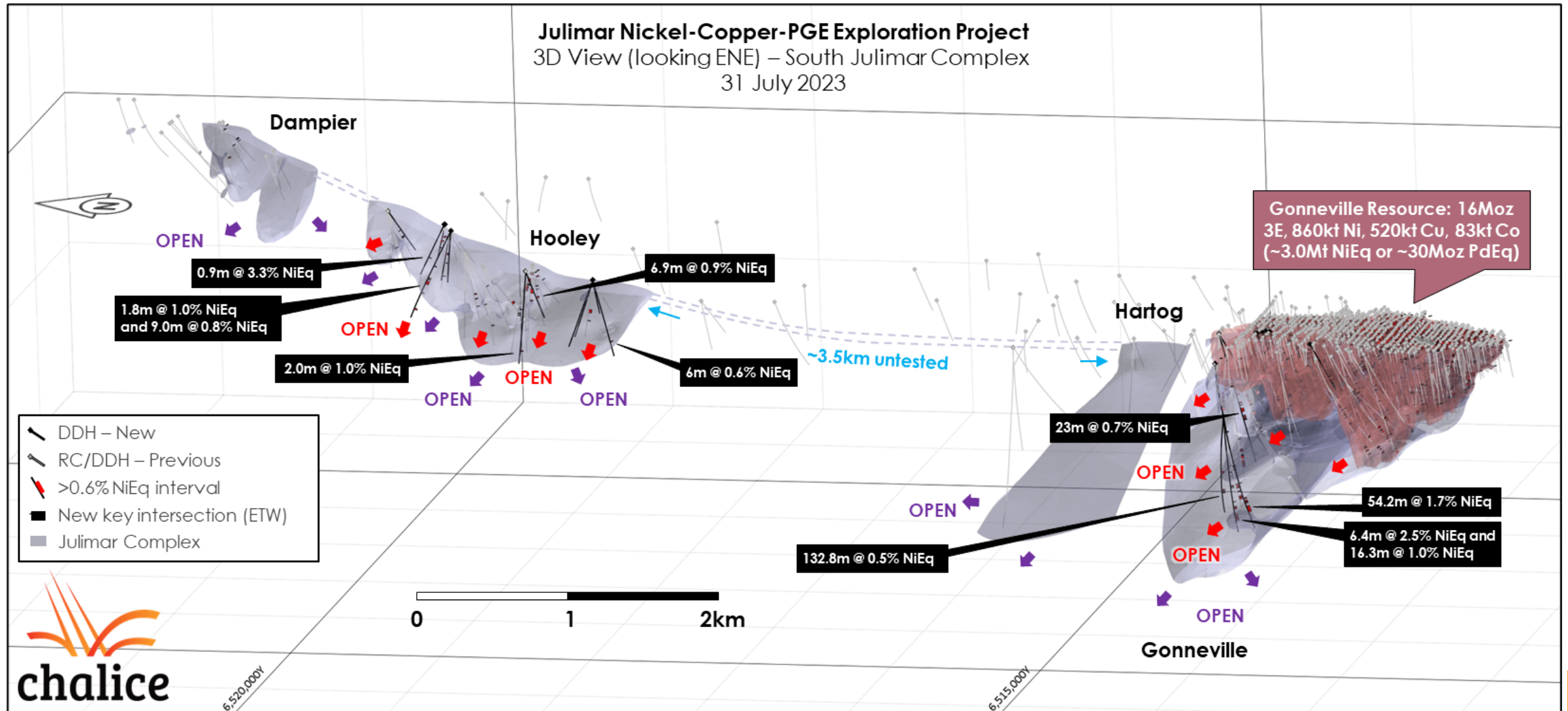
3D view (looking NW) of the Julimar Complex, Gonneville Deposit, regional targets, soil geochemistry over magnetics



# Recent deeper drilling at Hooley indicates a **thickening of the Complex and higher grades at depth** – further drilling planned from late Q3 2023



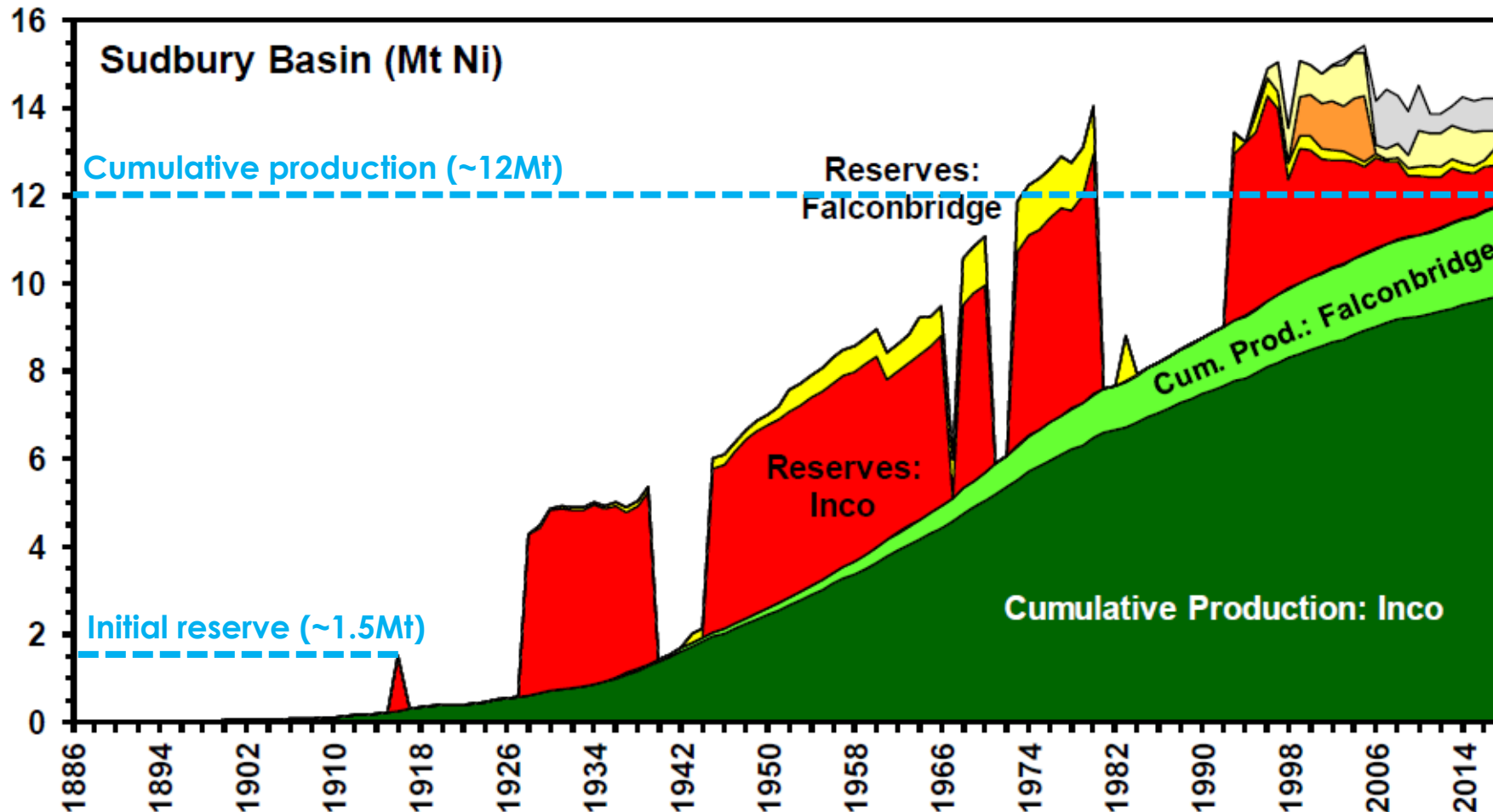
South Julimar Complex 3D View (looking ENE) – drill holes and Julimar Complex intrusive geology



Many major orthomagmatic systems worldwide **grow materially** throughout their life with drilling and commodity price escalation



### Sudbury Basin resources and cumulative production over time – 1900-2021



- After **130+ years** of mining, Sudbury still has a **significant nickel resource remaining**
- Cumulative production from the camp has **materially exceeded** initial estimates of resources and reserves, due not only to continued exploration but commodity price escalation over decades
- This characteristic of large orthomagmatic systems (like Gonnerville) makes them **strategically valuable**

# Regional exploration drilling, the upcoming Gonneville Scoping Study and ongoing strategic partnering process represent **key catalysts**



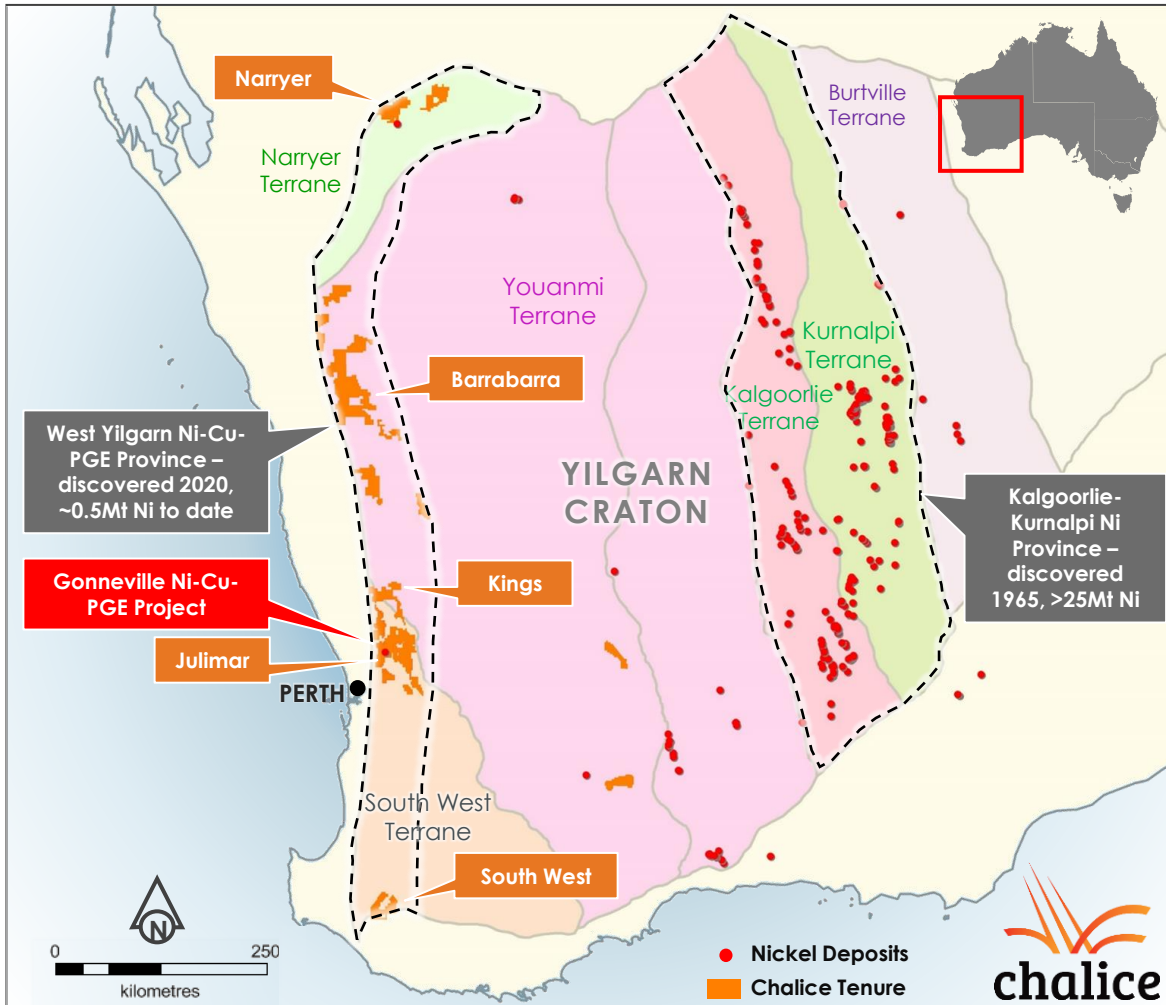
Chalice's multi-track value creation strategy at the **Gonneville Project** is to advance development studies and progress regulatory approvals for a potential mine at Gonneville (located entirely on Chalice-owned farmland), **continue exploration in the surrounding region** to determine the full scale of the mineral system, and attract a **strategic partner** who adds technical, financial and marketing capabilities.



... in addition, province scale exploration is ramping up across the new West Yilgarn Ni-Cu-PGE Province

<sup>1</sup> Refer to full Mineral Resource Statement in the Appendix. Timeline is indicative and subject to exploration and study outcomes

# The Gonneville discovery has kick-started the new West Yilgarn Ni-Cu-PGE Province, which could deliver **more major critical mineral discoveries**



- Many of the **'Giant' ortho-magmatic nickel-copper-PGE sulphide** deposits such as Norilsk, Jinchuan, Thompson and Voisey's Bay are located proximal to the margin of cratons
- In WA, the eastern Yilgarn (Archean craton) hosts several world-class nickel sulphide deposits with over **25Mt of Ni** discovered since 1965
- ~1,200km long western margin of the Yilgarn presents a **similar geological setting, but is almost entirely unexplored**
- Chalice made the first major ortho-magmatic Ni-Cu-PGE discovery in the region (Gonneville), subsequently staking **>8,000km<sup>2</sup>**
- Option and earn-in recently executed in **additional ~1,600km<sup>2</sup>** holding east of the Gonneville discovery
- Chalice has **'First mover' advantage** in this exciting new province – strong potential to deliver **more major Ni-Cu-PGE discoveries**
- **>10 new targets to be drilled**, commencing H2 2023 according to cropping access and timing of approvals
- **The prize is significant** – more shallow G1 style massive sulphides with grades **c. 3.2% Ni, 1.2% Cu, 10g/t PGE**

# Highlights



A world class, tier-1 scale green metals project in Western Australia – a unique, highly leveraged commodity exposure



A team with a track record of discovery and shareholder value creation



Significant exploration upside at Gonneville and in the new West Yilgarn Ni-Cu-PGE Province

# Appendix

A group of construction workers in high-visibility vests and jackets standing outdoors in a field. In the foreground, a man in a dark jacket and sunglasses is holding a clipboard and looking towards the group. The background shows trees and a clear sky.

# Chalice is actively growing its organisational capability



## Board of Directors



### **Derek La Ferla, Chairman**

- Highly regarded ASX200 chair and company director with 30+ years experience as a corporate lawyer
- Chair of Poseidon Nickel and formerly Chair of Sandfire Resources



### **Alex Dorsch, Managing Director and Chief Executive Officer**

- Diverse experience in consulting, engineering and corporate advisory in the energy and resources sectors
- Previously a Specialist consultant with McKinsey & Company



### **Morgan Ball, Non-Exec Director**

- Chartered Accountant with 25+ years experience in the resources, logistics and finance industries
- Formerly CFO of Northern Star Resources and Saracen Mineral Holdings



### **Garret Dixon, Non-Exec Director**

- 30+ years experience in resources and mining contracting sectors
- Formerly Executive VP Alcoa & President Bauxite



### **Stephen McIntosh, Non-Exec Director**

- Highly regarded mining executive with 30+ years experience in exploration, major project studies and execution
- Formerly Group Executive and Head of Exploration & Development Projects at Rio Tinto



### **Linda Kenyon, Non-Exec Director**

- Corporate lawyer and senior executive with 30+ years experience
- Formerly Company Secretary and member of Executive Leadership Team at Wesfarmers



### **Jo Gaines, Non-Exec Director**

- Extensive experience in intergovernmental negotiations and stakeholder engagement
- Chair of the Government Employees Superannuation Board (GESB) and a Director of Development WA and Technology Metals Australia Limited

## Management



### **Richard Hacker, GM Strategy and Commercial**

- Chartered Accountant with 20+ years experience in resource company financing, corporate and commercial management
- Previously Company CFO since 2006



### **Dr Kevin Frost, GM Discovery and Growth**

- Co-recipient of PDAC 2023 Thayer Lindsley Award and AMEC's 2022 Prospector of the Year Award for the Gonnevillie discovery, and previously in 2009 for the discovery of the Spotted Quoll nickel sulphide deposit in WA (Western Areas)



### **Bruce Kendall, GM Exploration**

- Co-recipient of AMEC's Prospector of the Year Award in 2012 for the discovery of the world-class Tropicana gold deposit in WA (AngloGold Ashanti)



### **Dr Soolim Carney, GM Environment and Community**

- Environment, health and safety, indigenous affairs, govt relations and community specialist with 20+ years experience
- Former Regional Environment Manager for Alcoa Australia



### **Mike Nelson, GM Project Development**

- 30+ years experience in operational and technical leadership roles
- Instrumental in leading several mega-projects for mining internationals including Barrick Gold and Teck Resources

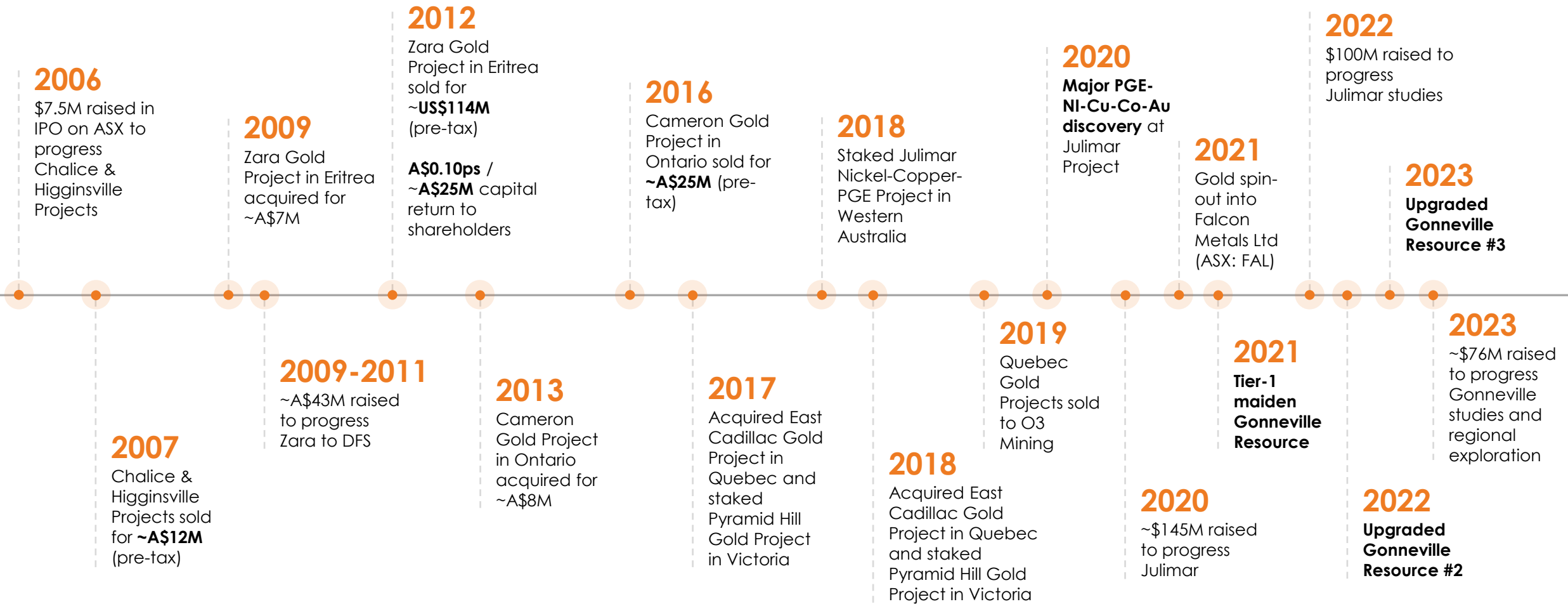


### **Chris MacKinnon, CFO**

- Qualified accountant and lawyer with 15+ years experience of professional and corporate experience in the energy and resources industry



# Since our 2006 IPO, we have acquired quality assets, advanced projects quickly and generated exceptional returns



# The growing battery industry needs new, large scale and sustainable sources of battery-grade nickel – a **unique opportunity for Gonneville**



Battery-grade nickel consumers forecast to become heavily reliant on supply sources that **do not meet sustainability standards**, i.e. NPI



With **860kt of contained nickel** defined to date, Julimar has the potential to become a globally significant source of class 1 nickel, which has a much lower carbon footprint than other sources

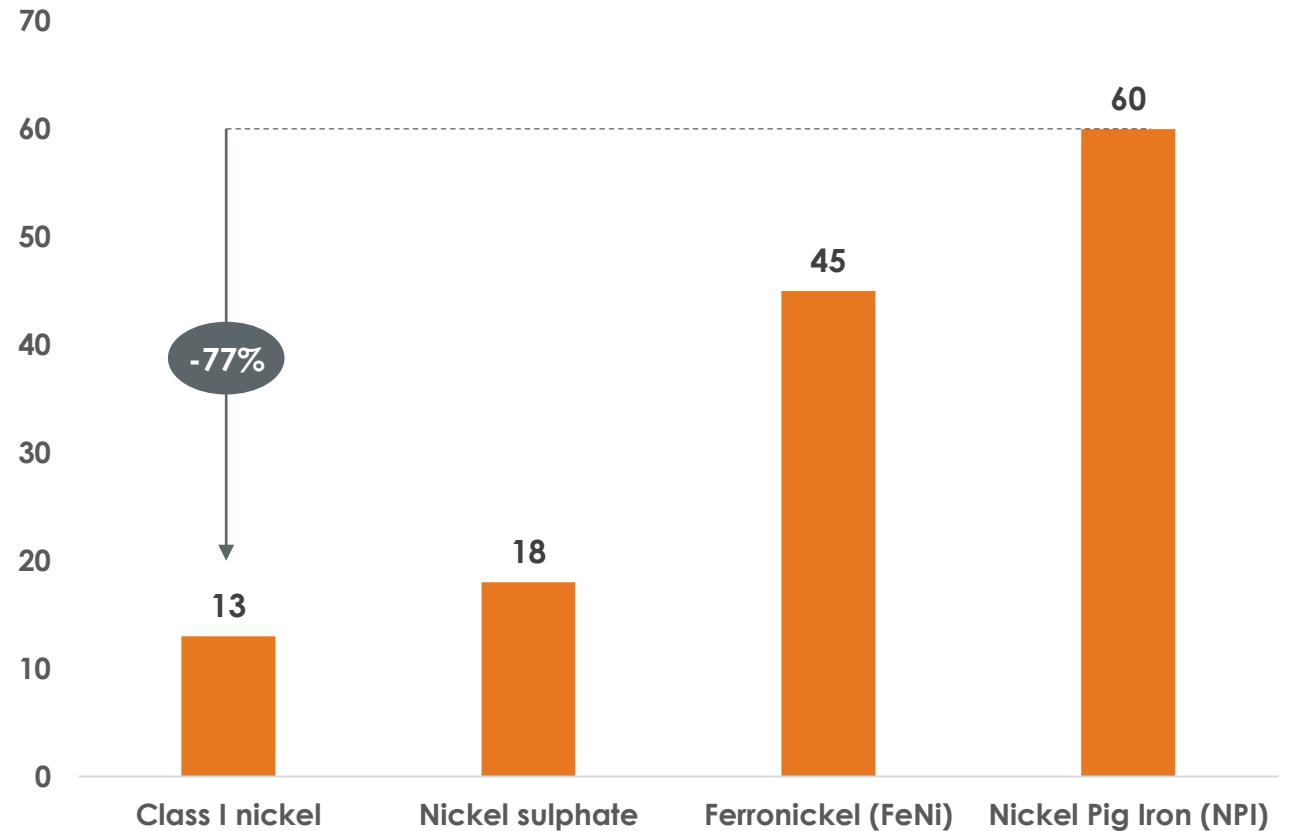


Gonneville's proximity to WA's **world class power grid and infrastructure** make it uniquely positioned to deliver low carbon intensity metals



Class 1 nickel sources are likely to **demand a premium**, driven by the need to comply with emissions targets and to satisfy increasing sensitivity to sustainability standards

**Estimated average carbon intensity of nickel sources (kgCO<sub>2</sub> eq. per kg Ni)**

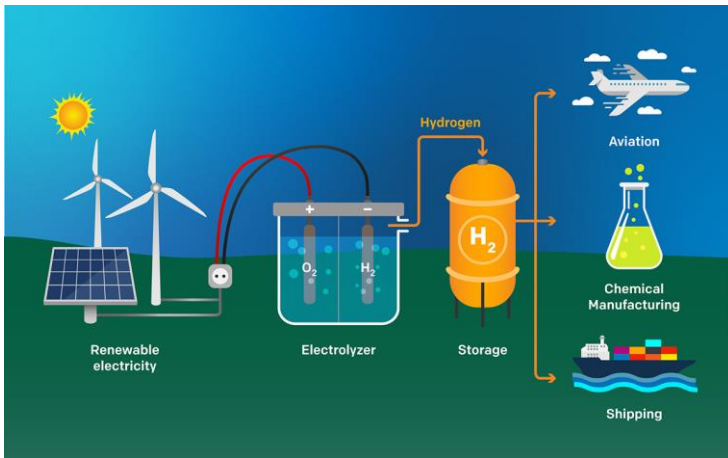


# Platinum and Palladium are essential in every stage of the hydrogen value chain, a critical solution to **achieving net-zero carbon emissions**



## Production

Green hydrogen produced by electrolysis of water using renewable energy (wind, solar, hydro)



**PGEs are essential catalysts in the Proton Exchange Membrane (PEM) Electrolyser**

## Transport and Storage

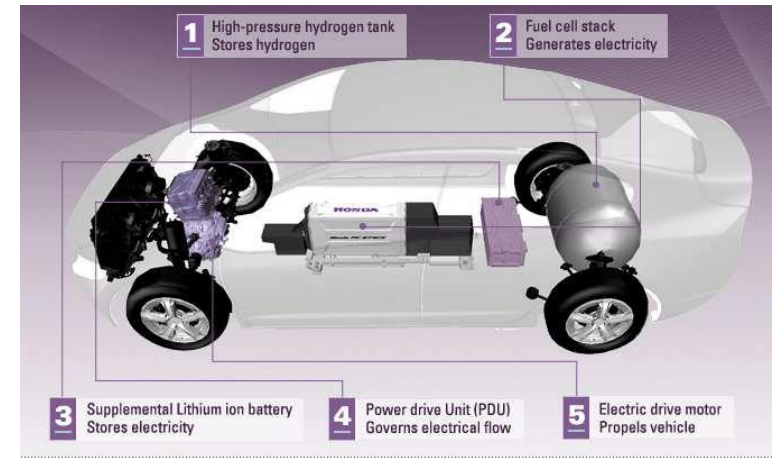
Long-term storage and transport of green hydrogen likely to be achieved using liquified ammonia (NH<sub>3</sub>) as carrier



**Pd is an essential catalyst in hydrogen-ammonia conversion and purification**

## Utilisation

Green hydrogen ideal for use in green steel and Fuel Cell Electric Vehicles (FCEVs), likely to be the dominant technology for heavy transport such as trucks, trains and ships



**PGEs are essential catalysts in most hydrogen fuel cell designs**

# Gonneville Mineral Resource Estimate (JORC Code 2012), 28 March 2023



Domain	Cut-off Grade	Category	Mass	Grade								Contained Metal								
				(Mt)	Pd (g/t)	Pt (g/t)	Au (g/t)	Ni (%)	Cu (%)	Co (%)	NiEq (%)	PdEq (g/t)	Pd (Moz)	Pt (Moz)	Au (Moz)	Ni (kt)	Cu (kt)	Co (kt)	NiEq (kt)	PdEq (Moz)
Oxide	0.9g/t Pd	Measured	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Indicated	7.3	1.9	-	0.06	-	-	-	-	-	2.0	0.45	-	0.01	-	-	-	-	0.47
		Inferred	0.2	1.9	-	0.07	-	-	-	-	-	2.0	0.01	-	0.00	-	-	-	-	0.02
		<b>Subtotal</b>	<b>7.5</b>	<b>1.9</b>	<b>-</b>	<b>0.06</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>2.0</b>	<b>0.47</b>	<b>-</b>	<b>0.01</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>0.49</b>
Sulphide (Transitional)	0.35% NiEq	Measured	0.38	0.82	0.17	0.03	0.19	0.17	0.020	0.70	2.2	0.01	-	-	0.72	0.63	0.07	2.7	0.03	
		Indicated	14	0.66	0.15	0.03	0.16	0.10	0.018	0.54	1.7	0.30	0.07	0.01	22	14	2.5	77	0.77	
		Inferred	0.27	0.60	0.16	0.03	0.15	0.12	0.015	0.54	1.7	0.01	-	-	0.42	0.32	0.04	1.5	0.01	
		<b>Subtotal</b>	<b>15</b>	<b>0.66</b>	<b>0.15</b>	<b>0.03</b>	<b>0.16</b>	<b>0.10</b>	<b>0.018</b>	<b>0.55</b>	<b>1.7</b>	<b>0.31</b>	<b>0.07</b>	<b>0.01</b>	<b>23</b>	<b>15</b>	<b>2.6</b>	<b>81</b>	<b>0.81</b>	
Sulphide (Fresh)	0.35% NiEq	Measured	2.3	1.1	0.26	0.03	0.24	0.18	0.019	0.87	2.7	0.08	0.02	-	5.4	4.2	0.43	20	0.20	
		Indicated	280	0.67	0.15	0.03	0.16	0.09	0.015	0.53	1.7	6.0	1.3	0.23	440	260	43	1500	15	
		Inferred	200	0.67	0.15	0.03	0.15	0.09	0.015	0.53	1.6	4.4	0.96	0.16	310	180	29	1100	11	
		<b>Subtotal</b>	<b>480</b>	<b>0.67</b>	<b>0.15</b>	<b>0.03</b>	<b>0.16</b>	<b>0.09</b>	<b>0.015</b>	<b>0.53</b>	<b>1.7</b>	<b>10</b>	<b>2.3</b>	<b>0.39</b>	<b>750</b>	<b>440</b>	<b>72</b>	<b>2600</b>	<b>26</b>	
Underground	0.40% NiEq	Measured	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Indicated	1.7	0.75	0.21	0.06	0.14	0.08	0.013	0.55	1.7	0.04	0.01	-	2.4	1.4	0.23	9.5	0.10	
		Inferred	52	0.78	0.17	0.03	0.16	0.11	0.015	0.59	1.8	1.3	0.28	0.05	83	56	7.7	310	3.1	
		<b>Subtotal</b>	<b>54</b>	<b>0.78</b>	<b>0.17</b>	<b>0.03</b>	<b>0.16</b>	<b>0.11</b>	<b>0.015</b>	<b>0.59</b>	<b>1.8</b>	<b>1.3</b>	<b>0.29</b>	<b>0.06</b>	<b>86</b>	<b>57</b>	<b>7.9</b>	<b>320</b>	<b>3.2</b>	
All		Measured	2.7	1.1	0.24	0.03	0.23	0.18	0.019	0.85	2.6	0.09	0.02	-	6.2	4.9	0.51	23	0.23	
		Indicated	300	0.70	0.15	0.03	0.16	0.09	0.015	0.54	1.7	6.8	1.4	0.26	460	280	45	1600	16	
		Inferred	250	0.70	0.15	0.03	0.15	0.09	0.015	0.54	1.7	5.7	1.2	0.22	390	230	37	1400	14	
		<b>Total</b>	<b>560</b>	<b>0.70</b>	<b>0.15</b>	<b>0.03</b>	<b>0.16</b>	<b>0.09</b>	<b>0.015</b>	<b>0.54</b>	<b>1.7</b>	<b>13</b>	<b>2.7</b>	<b>0.48</b>	<b>860</b>	<b>520</b>	<b>83</b>	<b>3000</b>	<b>30</b>	

Note some numerical differences may occur due to rounding to 2 significant figures.

PdEq oxide (Palladium Equivalent g/t) = Pd (g/t) + 1.27x Au (g/t)

NiEq sulphide (Nickel Equivalent %) = Ni (%) + 0.32x Pd(g/t) + 0.21x Pt(g/t) + 0.38x Au(g/t) + 0.83x Cu(%) + 3.00x Co(%)

PdEq sulphide (Palladium Equivalent g/t) = Pd (g/t) + 0.67x Pt(g/t) + 1.17 x Au(g/t) + 3.11x Ni(%) + 2.57x Cu(%) + 9.33x Co(%)

Underground resources are outside the pit above a 0.40% NiEq cut off grade based on sub-level caving mining method

Includes drill holes drilled up to and including 11 December 2022.

# Higher-grade sulphide component of Gonneville Resource (in pit and underground), 28 March 2023



Domain	Cut-off Grade	Category	Mass (Mt)	Grade								Contained Metal							
				Pd (g/t)	Pt (g/t)	Au (g/t)	Ni (%)	Cu (%)	Co (%)	NiEq (%)	PdEq (g/t)	Pd (Moz)	Pt (Moz)	Au (Moz)	Ni (kt)	Cu (kt)	Co (kt)	NiEq (kt)	PdEq (Moz)
High-grade Sulphide (Transitional)	0.6% NiEq	Measured	0.17	1.2	0.24	0.05	0.24	0.25	0.023	0.97	3.0	0.01	-	-	0.41	0.43	0.04	1.7	0.02
		Indicated	3.4	1.1	0.21	0.04	0.20	0.16	0.020	0.79	2.5	0.12	0.02	-	6.6	5.3	0.69	27	0.27
		Inferred	0.07	0.84	0.18	0.03	0.22	0.26	0.019	0.81	2.5	-	-	-	0.16	0.18	0.01	0.57	0.01
		<b>Subtotal</b>	<b>3.6</b>	<b>1.1</b>	<b>0.21</b>	<b>0.04</b>	<b>0.20</b>	<b>0.16</b>	<b>0.021</b>	<b>0.80</b>	<b>2.5</b>	<b>0.12</b>	<b>0.02</b>	<b>-</b>	<b>7.2</b>	<b>5.9</b>	<b>0.74</b>	<b>29</b>	<b>0.29</b>
High-grade Sulphide (Fresh)	0.6% NiEq	Measured	0.88	2.2	0.47	0.05	0.39	0.35	0.027	1.6	4.9	0.06	0.01	-	3.4	3.1	0.24	14	0.14
		Indicated	58	1.2	0.26	0.06	0.20	0.18	0.018	0.87	2.7	2.3	0.48	0.11	120	100	10	500	5.1
		Inferred	40	1.3	0.26	0.06	0.19	0.18	0.017	0.87	2.7	1.6	0.33	0.08	75	73	6.6	340	3.5
		<b>Subtotal</b>	<b>98</b>	<b>1.2</b>	<b>0.26</b>	<b>0.06</b>	<b>0.20</b>	<b>0.18</b>	<b>0.017</b>	<b>0.88</b>	<b>2.7</b>	<b>3.9</b>	<b>0.82</b>	<b>0.19</b>	<b>200</b>	<b>180</b>	<b>17</b>	<b>860</b>	<b>8.7</b>
Underground	>0.6% NiEq	Measured	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Indicated	0.4	1.2	0.36	0.12	0.14	0.11	0.014	0.78	2.5	0.02	-	-	0.61	0.46	0.06	3.3	0.03
		Inferred	13	1.4	0.27	0.06	0.20	0.20	0.017	0.93	2.9	0.58	0.12	0.03	26	26	2.2	120	1.2
		<b>Subtotal</b>	<b>14</b>	<b>1.4</b>	<b>0.28</b>	<b>0.06</b>	<b>0.20</b>	<b>0.19</b>	<b>0.017</b>	<b>0.93</b>	<b>2.9</b>	<b>0.60</b>	<b>0.12</b>	<b>0.03</b>	<b>27</b>	<b>26</b>	<b>2.3</b>	<b>130</b>	<b>1.3</b>
All		Measured	1.1	2.0	0.43	0.05	0.37	0.33	0.026	1.5	4.6	0.07	0.01	-	3.8	3.5	0.28	15	0.15
		Indicated	62	1.2	0.25	0.06	0.20	0.18	0.018	0.87	2.7	2.4	0.50	0.11	130	110	11	530	5.4
		Inferred	53	1.3	0.26	0.06	0.19	0.19	0.017	0.89	2.8	2.2	0.45	0.11	100	99	8.8	470	4.7
		<b>Total</b>	<b>120</b>	<b>1.3</b>	<b>0.26</b>	<b>0.06</b>	<b>0.20</b>	<b>0.18</b>	<b>0.017</b>	<b>0.88</b>	<b>2.7</b>	<b>4.7</b>	<b>0.97</b>	<b>0.22</b>	<b>230</b>	<b>210</b>	<b>20</b>	<b>1000</b>	<b>10</b>

Note some numerical differences may occur due to rounding to 2 significant figures.

This higher-grade component is contained within the reported global Mineral Resource.

$PdEq \text{ oxide (Palladium Equivalent g/t)} = Pd \text{ (g/t)} + 1.27 \times Au \text{ (g/t)}$

$NiEq \text{ sulphide (Nickel Equivalent \%)} = Ni \text{ (\%)} + 0.32 \times Pd \text{ (g/t)} + 0.21 \times Pt \text{ (g/t)} + 0.38 \times Au \text{ (g/t)} + 0.83 \times Cu \text{ (\%)} + 3.00 \times Co \text{ (\%)}$

$PdEq \text{ sulphide (Palladium Equivalent g/t)} = Pd \text{ (g/t)} + 0.67 \times Pt \text{ (g/t)} + 1.17 \times Au \text{ (g/t)} + 3.11 \times Ni \text{ (\%)} + 2.57 \times Cu \text{ (\%)} + 9.33 \times Co \text{ (\%)}$

Underground resources are outside the pit above a 0.40% NiEq cut off grade based on sub-level caving mining method

Includes drill holes drilled up to and including 11 December 2022.

# Metal equivalent assumptions of Gonneville Resource, 28 March 2023



Based on metallurgical testwork completed to date for the sulphide domain, it is the Company's opinion that all the quoted elements included in metal equivalent calculations (palladium, platinum, gold, nickel, copper and cobalt) have a reasonable potential of being recovered and sold.

Only limited samples have been collected from the transitional zone due to its relatively small volume. Therefore, the metallurgical recovery of all metals in this domain are unknown. However, given the relatively small proportion of the transition zone in the Mineral Resource, the impact on the metal equivalent calculation is not considered to be material.

Metal equivalents for the transitional and sulphide domains are calculated according to the formula below:

- $NiEq\% = Ni(\%) + 0.32x Pd(g/t) + 0.21x Pt(g/t) + 0.38x Au(g/t) + 0.83x Cu(\%) + 3.00x Co(\%)$ ;
- $PdEq(g/t) = Pd(g/t) + 0.67x Pt(g/t) + 1.17x Au(g/t) + 3.11x Ni(\%) + 2.57x Cu(\%) + 9.33x Co(\%)$

Metal recoveries used in the metal equivalent calculations are based on rounded average Resource grades for the sulphide domain (>0.35% NiEq cut-off):

- Pd – 60%, Pt – 60%, Au – 70%, Ni – 45%, Cu – 85%, Co – 45%.

Metal prices used are consistent with those used in the Whittle pit optimisation (based on long term consensus analyst estimates):

- US\$1,800/oz Pd, US\$1,200/oz Pt, US\$1,800/oz Au, US\$24,000/t Ni, US\$10,500/t Cu and US\$72,000/t Co.

Initial metallurgical testwork indicates that only palladium and gold are likely to be recovered in the oxide domain, therefore no NiEq grade has been quoted for the oxide. The PdEq grade for the oxide has been calculated using the formula:

$PdEq\ oxide(g/t) = Pd(g/t) + 1.27 \times Au(g/t)$ .

- Metal recoveries based on limited metallurgical test work completed to date:
  - Pd – 75%, Au – 90%.
- Metal prices used are consistent with those used in the pit optimisation:
  - US\$1,800/oz Pd, US\$1,800/oz Au

For additional information on the assumptions used in the calculation of metal equivalents, refer to the ASX announcement titled "Gonneville Resource increases by approx. 50% to 3Mt NiEq", dated 28 March 2023.

# Australian Primary Nickel Sulphide Resources (31 Jul 2023)



Rank	Asset	Company	Stage	Source Announcement	Date	Total Measured (Meas.), Indicated (Ind.) and Inferred (Inf.) resources								Meas.	Ind.	Inf.
						Tonnage (Mt)	Nickel (kt, %)	Copper (kt, %)	Cobalt (kt, ppm)	Gold (koz, g/t)	Platinum (koz, g/t)	Palladium (koz, g/t)	Silver (koz, g/t)	Tonnage (Mt)	Tonnage (Mt)	Tonnage (Mt)
1	West Musgrave	BHP	Feasibility	West Musgrave Mineral Resource and Ore Reserve Statement (IGO)	23-Sep-22	390	1,200 0.30%	1,300 0.33%	47 120	752 0.06	1,003 0.08	1,129 0.09	10,659 0.85	91	240	59
<b>2</b>	<b>Gonneville</b>	<b>Chalice</b>	<b>Exploration</b>	<b>Gonneville Resource increases by ~50% to ~3Mt NiEq</b>	<b>28-Mar-23</b>	<b>560</b>	<b>860 0.16%</b>	<b>520 0.09%</b>	<b>83 150</b>	<b>480 0.03</b>	<b>2,700 0.15</b>	<b>13,000 0.7</b>	- -	<b>2.7</b>	<b>300</b>	<b>250</b>
3	Cosmos	IGO	Development	FY22 Cosmos and Forrestania Resources and Reserves	30-Aug-22	67	656 0.98%	-	-	-	-	-	-	13.6	38.9	14.5
4	Avebury Restart	Mallee Resources	Restart	Binding Financing Facility and Operations Update	19-Jun-23	29	264 0.90%	-	7 229	-	-	-	-	-	8.7	20.7
5	Black Swan	Poseidon	Restart	Full Steam Ahead for Black Swan Restart	07-Jun-23	26	189 0.72%	-	-	-	-	-	-	0.8	15.1	10.4
6	West Jordan	BHP	Exploration	Annual Report to Shareholders	06-Sep-22	43	224 0.52%	-	-	-	-	-	-	-	-	43
7	Venus	BHP	Exploration	Annual Report to Shareholders	06-Sep-22	11	189 1.71%	-	-	-	-	-	-	1.5	7.5	2.1
8	Jericho	BHP	Exploration	Annual Report to Shareholders	06-Sep-22	31	183 0.59%	-	-	-	-	-	-	-	-	31
9	Fisher East	Kinterra	Exploration	Fisher East Resource Increased to 134.1kt Contained Nickel (CNR)	15-Aug-22	8	134 1.79%	-	-	-	-	-	-	-	2.8	4.7
10	Sherlock Bay	Sabre Resources	Exploration	Sherlock Bay Ni Scoping Study Delivers Positive Cashflow	17-Jan-23	25	99 0.40%	22 0.09%	5 220	-	-	-	-	12.5	6.1	6.1

Note: Values presented in the above table have been rounded and where totals do not add to their components is due to rounding.



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