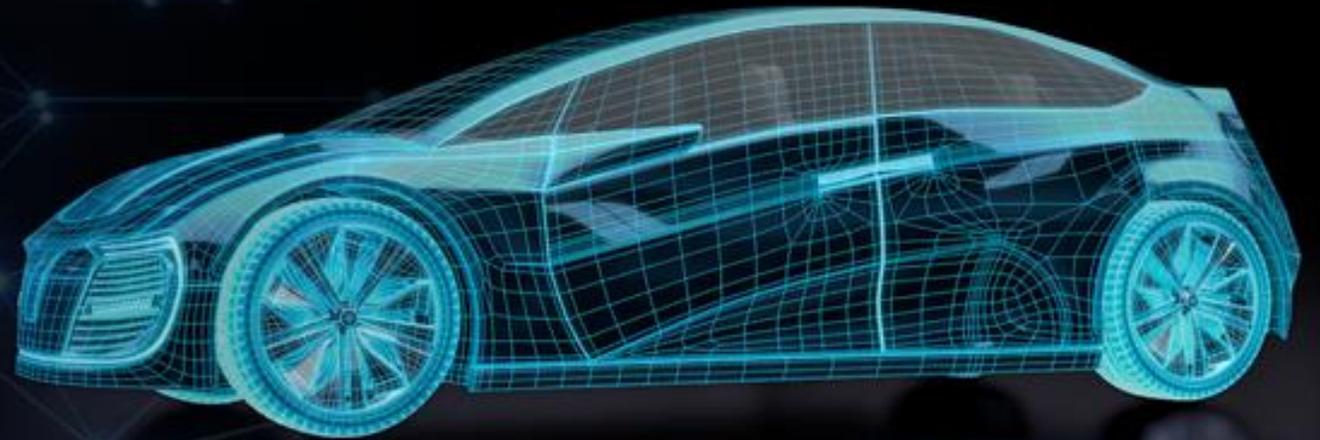




**BUILDING THE NEXT WA  
MANGANESE OPERATION**

PRESENTATION – DECEMBER 2021



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## COMPETENT PERSONS STATEMENT

The information in this Report that relates to Mineral Resources of the Company is based on, and fairly represents, information and supporting documentation that has been reviewed and prepared by Robert Wason, who is a Senior Consultant - Geology at Mining Insights Pty Ltd and is a member of AusIMM.

Mr. Wason has sufficient experience, which is relevant to the style of mineralisation and type of deposit under consideration and to the activity, which they are undertaking to qualify as an Expert and Competent Person as defined under the VALMIN Code and in the 2012 Edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’ (“JORC Code 2012”). Mr. Wason consents to the inclusion in this announcement of the matters based on the information in the form and context in which they appear.

The information in this report that relates to the Hill 616 Mineral Resources is based on information compiled by Mr Mark Pudovskis and Mr Aaron Meakin. Mr Mark Pudovskis is a full-time employee of CSA Global Pty Ltd and is a Member of the Australasian Institute of Mining and Metallurgy (AusIMM). Mr Aaron Meakin is a full-time employee of CSA Global Pty Ltd and is a Member and Chartered Professional of the Australasian Institute of Mining and Metallurgy (AusIMM). Mr Mark Pudovskis and Mr Aaron Meakin have sufficient experience relevant to the style of mineralisation and type of deposit under consideration and to the activity which they are undertaking to qualify as Competent Persons as defined in the 2012 edition of the Australasian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code). Mr Mark Pudovskis and Mr Aaron Meakin consent to the disclosure of the information in this report in the form and context in which it appears. Mr Mark Pudovskis assumes responsibility for matters related to Sections 1 and 2 of JORC Table 1, while Mr Aaron Meakin assumes responsibility for matters related to Section 3 of JORC Table 1.

Dr Parry has sufficient experience of the ore sorting test work under consideration to be aware of problems that could affect the reliability of the data and to qualify as a Competent Person as defined in the 2012 Edition of the Joint Ore Reserves Committee (JORC) Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Dr Parry consents to the inclusion in this report of the matters based on information in the form and context in which they appear.

## EMERGING WA MANGANESE DEVELOPER

- ◆ Focused on building a DSO/ Simple Beneficiation Low CAPEX Project
- ◆ Significant total Inferred Mineral Resources to 121mt over two projects:
  - Oakover Project
    - Inferred JORC 2012 Mineral Resource estimate of 64 Mt @ 10% Mn\*
  - Hill 616 Project
    - Inferred JORC 2012 Mineral Resource estimate of 57.5 Mt @ 12.2% Mn\*
- ◆ Targeting initial production through DSO / simple processing potential
  - ◆ to deliver early production and cash-flow
  - ◆ DSO potential from Supergene zone
  - ◆ Ore sorting and DMS
- ◆ Long term strategy to evaluate potential to supply growing Manganese Sulphate for Li-Ion Batteries market
- ◆ Led by a proven and experienced management and board, with strong manganese credentials



# OAKOVER RAPID DEVELOPMENT PROGRAM STRATEGY



- ◆ Evaluate low capital, fast start up potential of Oakover
- ◆ Core workstreams progressing as planned:
  - ◆ Completion of RC Drill program
    - ◆ 233 holes for ~ 10,000m, assays pending
    - ◆ Combination of infill and extensional RC drilling
    - ◆ Program developed to improve and grow existing 64Mt Inferred Mineral Resource estimate
  - ◆ Bulk samples to be used for metallurgical testing
    - ◆ Sixty Sixer Bulk Sample taken
    - ◆ Karen Bulk Sample planned for December 2021
  - ◆ Beneficiation study focusing on both DMS and/or ore sorting
  - ◆ Initial Hydrometallurgy test work
  - ◆ Haulage and Port Infrastructure Study
- ◆ Program to provide key inputs for expected commencement of PFS in Q4 2021

# CORPORATE OVERVIEW



**EVAN CRANSTON**  
Chairperson

Mr Cranston is an experienced mining executive with a background in corporate and mining law.



**PETER ALLEN**  
Managing Director

Mr Allen is a mining executive with more than 20 years experience in marketing of manganese, lithium and a range of other commodities.



**WEI LI**  
Finance Director

Mr Li is a Chartered Accountant with extensive professional experience in the resource industry, international trade, capital markets, project managing initial public offers and spin-outs and financial accounting.



**ASHLEY PATTISON**  
Non-executive Director

Mr Pattison has over 20 years' experience in the resources sector from both a corporate finance and operational perspective. Qualified as chartered accountant, he has extensive experience in operations, finance, strategy and corporate finance.

## Shareholders (31-8-21)

Tolga Kumova	<b>10.4%</b>
Mining Equities	<b>6.67%</b>
Board & management	<b>4.35%</b>
Top 20 shareholders	<b>47%</b>

## ASX code

**FRB**

Share price (26-11-21)

**\$0.415**

Shares on issue

**54.575m**

Market capitalisation

**\$23.0m**

Options

**18m**

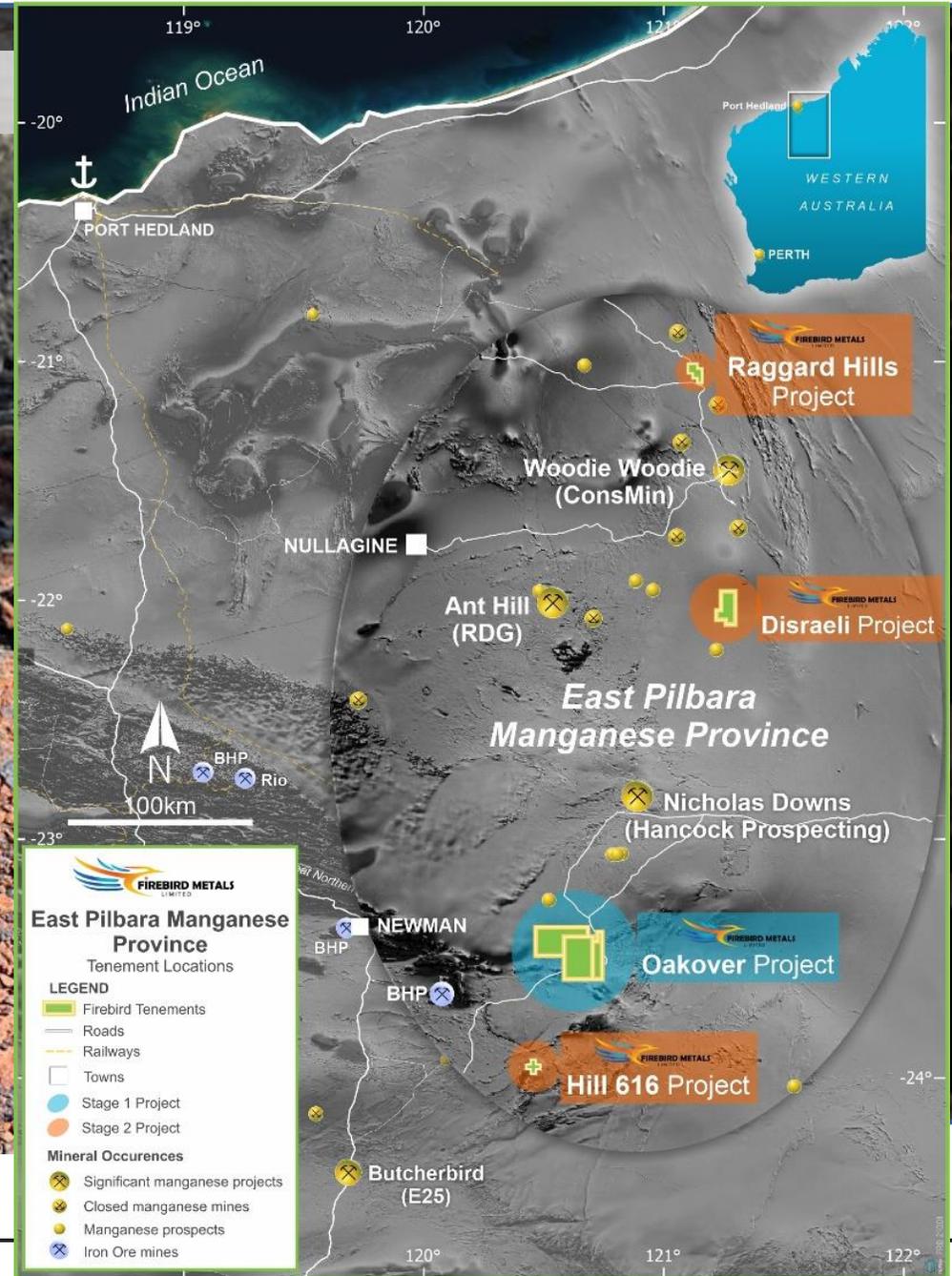
Performance rights

**3.3m**

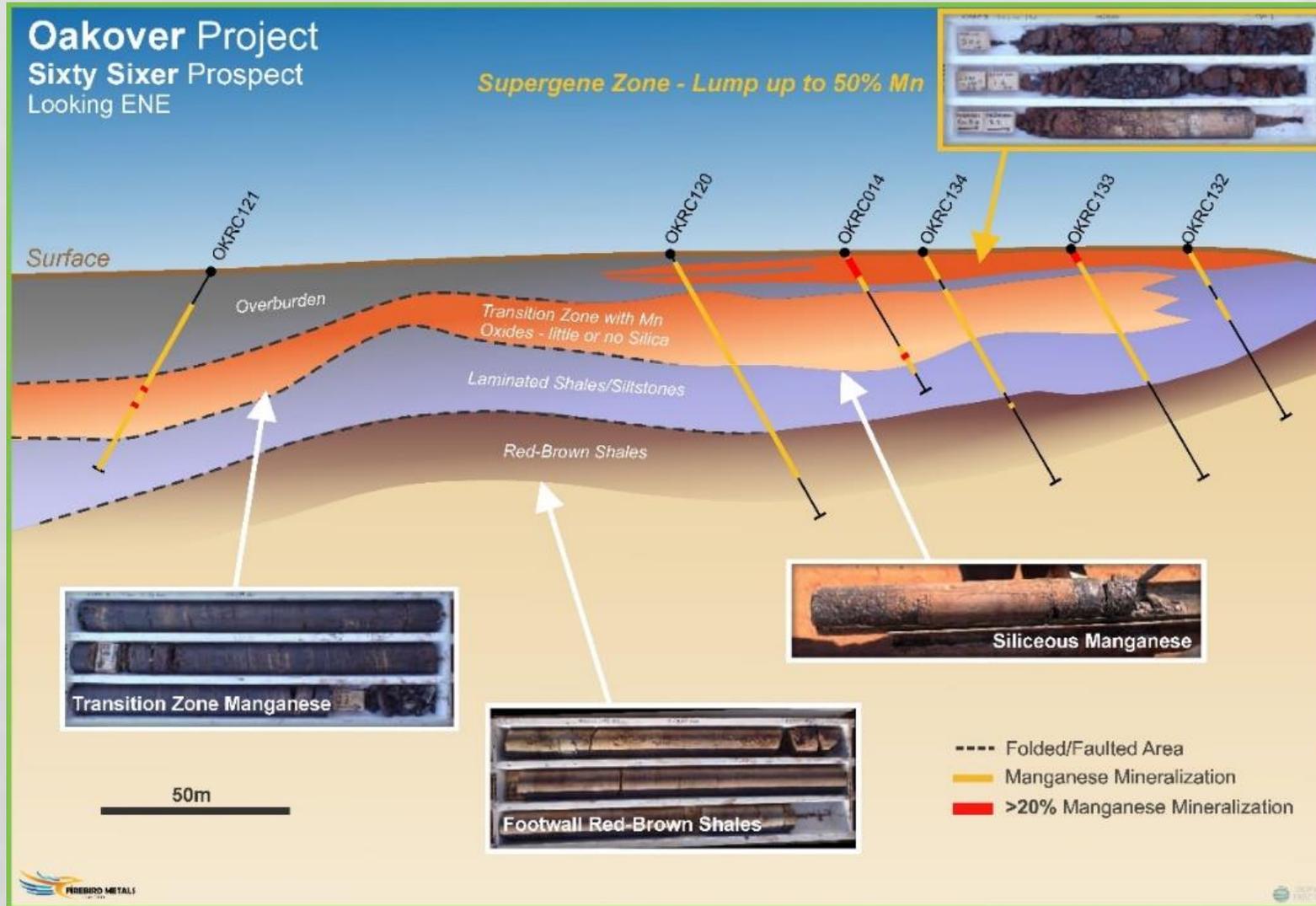
Cash (30-9-21)

**\$3.0 m**

# Project Portfolio



# FLAGSHIP OAKOVER PROJECT



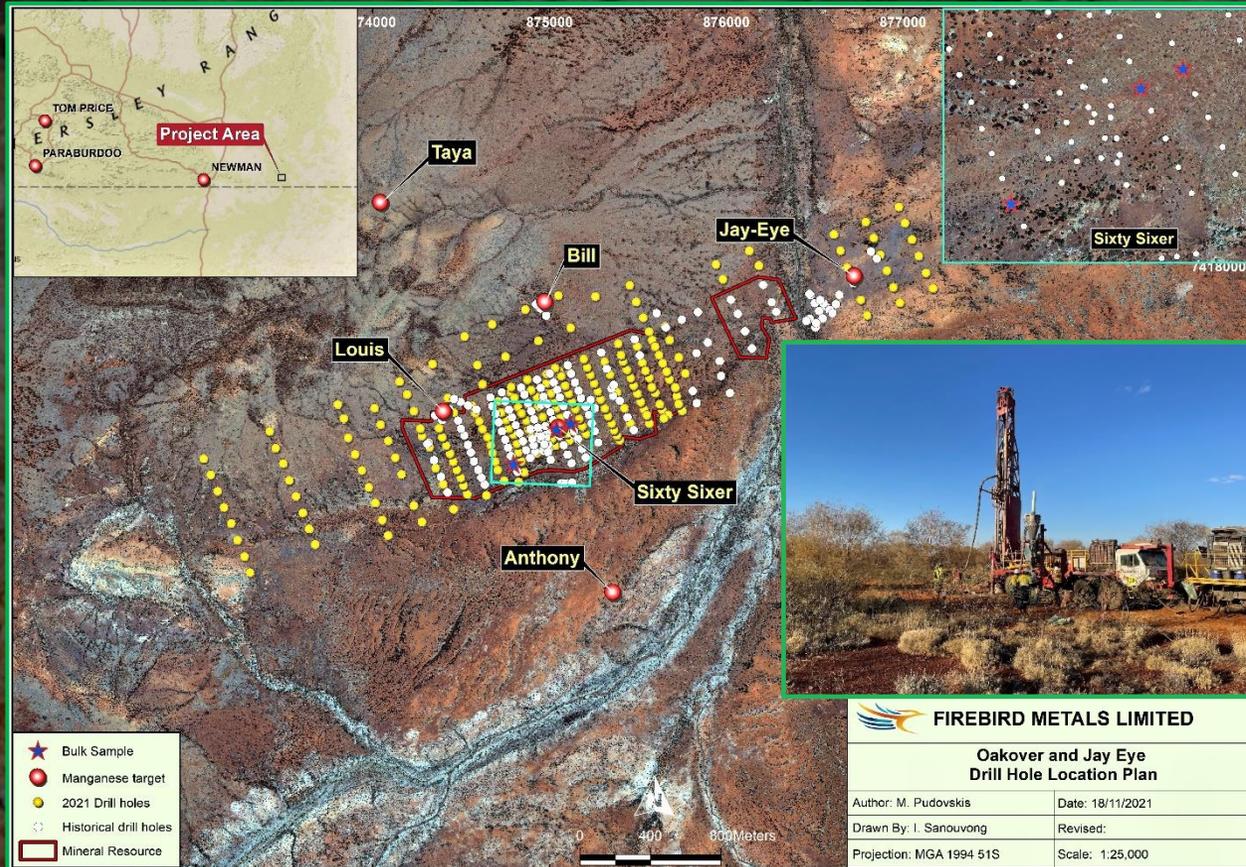
- ◆ Located in premier mining jurisdiction
- ◆ Near surface / shallow order body
- ◆ Existing JORC 2012 Inferred Resource of 64Mt at 10% Mn\*

(8% Mn cut-off applied), reported in accordance with the JORC Code 2012 (H&SC Consultants, August 2012)

Source: Brumby Resources AGM presentation November 2011

# OAKOVER - RC Drill Program Complete

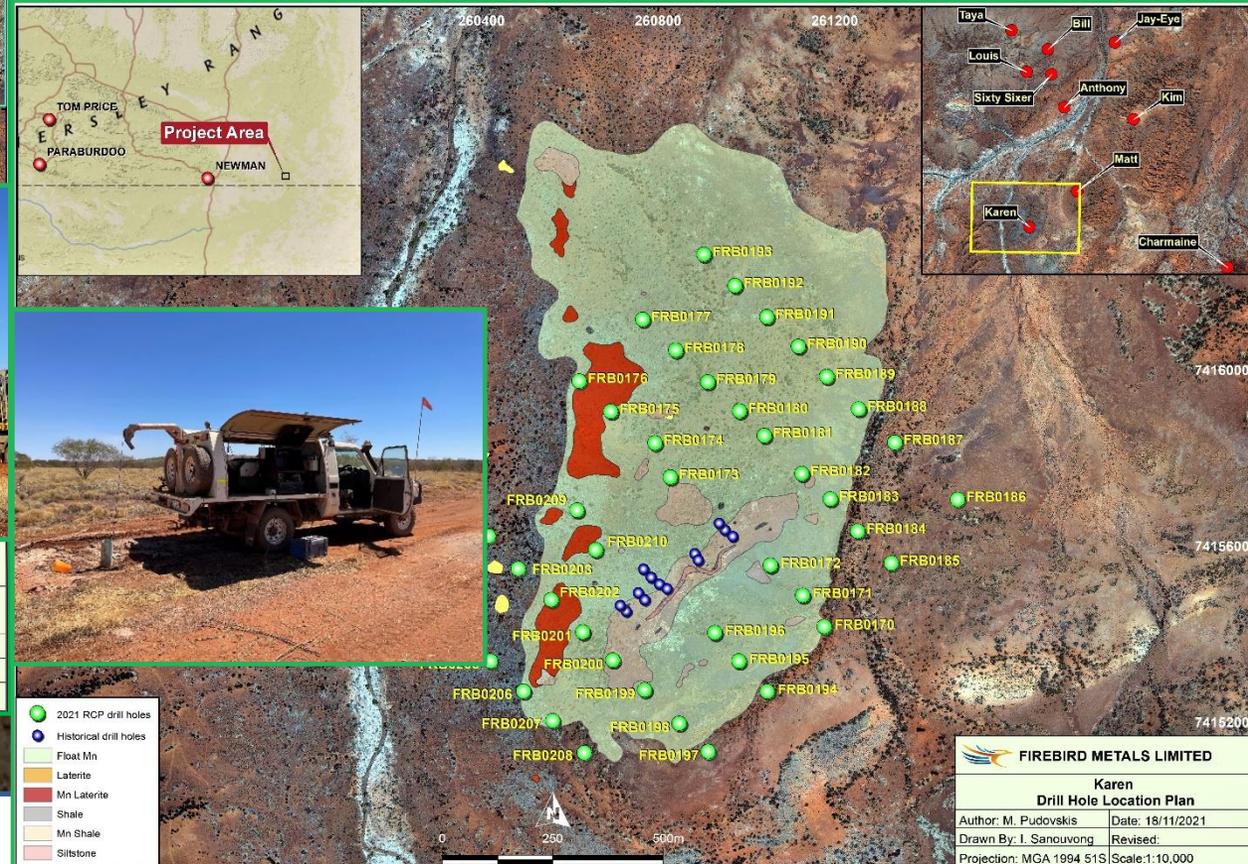
- ◆ Completion of 233 holes for ~ 10,000m, assays pending
- ◆ Combination of infill and extensional RC drilling
- ◆ Down hole geophysics
- ◆ Bulk sampling at Sixty Sixer



**FIREBIRD METALS LIMITED**

**Oakover and Jay Eye Drill Hole Location Plan**

Author: M. Pudovskis	Date: 18/11/2021
Drawn By: I. Sanouvang	Revised:
Projection: MGA 1994 51S	Scale: 1:25,000

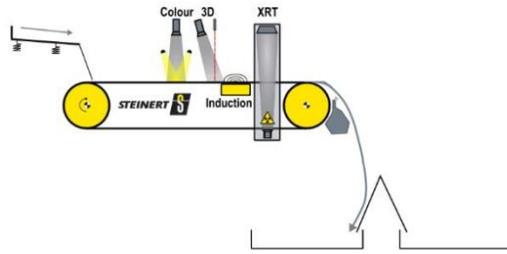


**FIREBIRD METALS LIMITED**

**Karen Drill Hole Location Plan**

Author: M. Pudovskis	Date: 18/11/2021
Drawn By: I. Sanouvang	Revised:
Projection: MGA 1994 51S	Scale: 1:10,000

# OAKOVER - Diamond Core Metallurgical Test Work / Ore Sorting



- Successful early-stage Ore Sorting test work completed by STEINERT \*
- Process takes measurements from all four sensors simultaneously:
  - Colour camera, 3D laser, Induction & X-ray transmission (XRT)
- Primary objective to identify and selectively sort the massive manganese from waste
- Stage two ore sorting processing underway
- Further test work planned on larger bulk test samples

Refer ASX release "Very Positive initial Ore sorting results, Oakover Drilling" dated 11/10/21

OAKOVER - Diamond Core Metallurgical Test Work / Ore Sorting



## OAKOVER RAPID DEVELOPEMNT PROGRAM SCORE CARD

CSA technical review	Complete	✓
Heritage surveys	Complete	✓
~10,000m RC drilling program	Complete	✓
Down hole geophysics	Complete	✓
Diamond core – recovered, logged & assayed	Complete	✓
Initial ore sorting test work	Complete	✓
Crush, screening & scrubbing test work	Complete	✓
Bulk Sample – Sixty Sixer	Complete	✓
Stage 2 ore sorting test work	Underway	
Bulk Sample – Karen	Planned for December 21	
Logistics Study – haulage and port	Consultant engaged and underway	
RC drill assay results	All samples at lab, awaiting results, approx. 30% received	
Revised Resource statement	CSA engaged, awaiting assay results,	
Heavy media separation test work	Contracted - awaiting product from Stage 2 ore sorting	
Commencement of PFS	Planned Q4 2021	
Stage 3 Ore sorting Test work – Bulk Sample	Planned Q1 2022	



## HILL 616 – Building the manganese pipeline



- ◆ Located 85km southeast of Newman
- ◆ Technical Review of Hill 616 prospect completed by CSA Global
- ◆ Mineralisation was found to be shallow (mostly within 20 metres of the surface), gently dipping and laterally extensive across target area
- ◆ Historical drilling of more than 4,900m over a strike of 2.2 km
- ◆ Hill 616 exhibits many of the geological characteristics of flagship Oakover Project
- ◆ Large number of Significant Manganese intercepts, including:
  - 13m @ 15.1% Mn from Surface
  - 12m @ 15.9 % Mn from 4m
  - 12m @ 15.2 % Mn from 3m
  - 10m @ 15.8 % Mn from 2m

Zone	Mineral Resource Classification	Tonnes (Mt)	Mn (%)	Fe(%)	SiO <sub>2</sub> (%)	Al <sub>2</sub> O <sub>3</sub> (%)	P (%)	LOI (%)
Manganiferous shale	Inferred	49.3	11.4	17.3	40.0	8.5	0.13	7.6
Supergene manganese	Inferred	8.1	17.4	16.8	30.1	9.4	0.09	9.9
<b>Grand Total</b>	Inferred	57.5	12.2	17.2	38.6	8.6	0.13	8.0

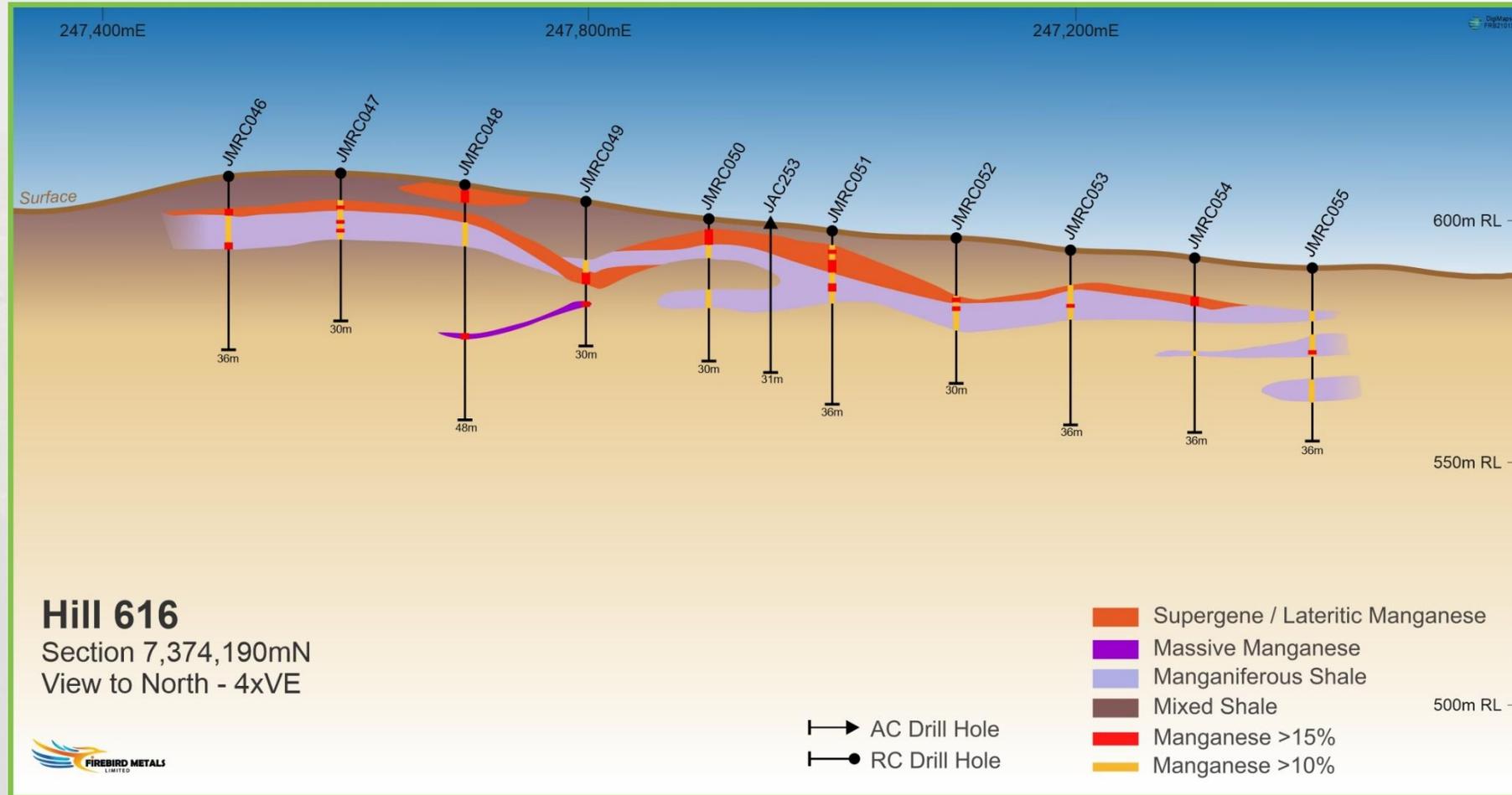
Historical Drill Summary 2009 to 2011

Drill Type	Drill Holes	Year	No. Drill Holes	Metres	Drill spacing
AC	JAC236 – JAC260	2009	25	578	Variable
Diamond Core	JDDH01 – JDDH16	2011	16	408.4	Variable
RCP	JMRC015 – JMRC169	2011	121	3,991	200m by 100m

Source: Firebird ASX announcement dated 11/11/21 and 1/12/21 \*\* Drilling completed by previous owner Errawarra Pty Ltd

# OTHER PROJECTS

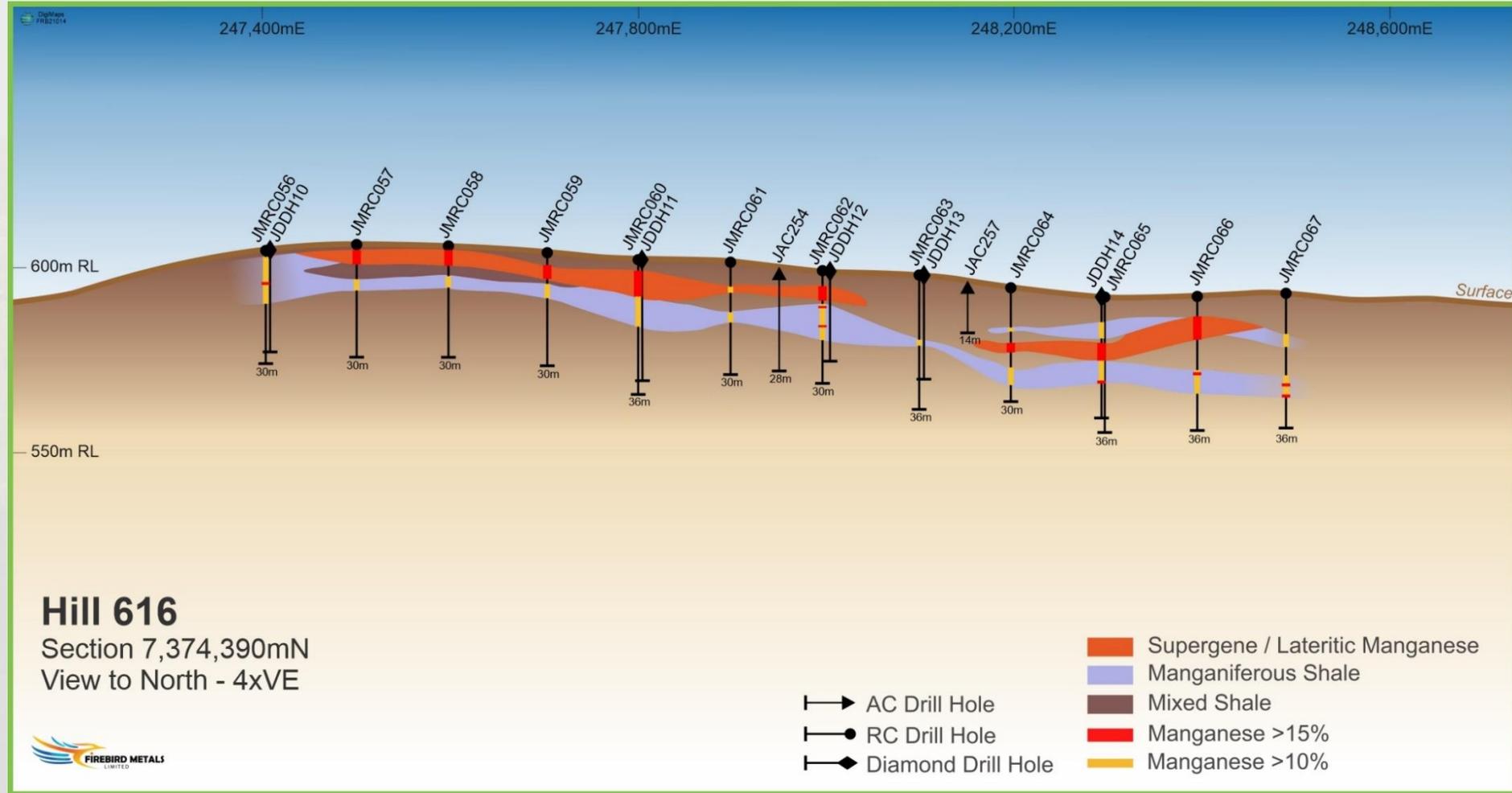
## HILL 616 – Building the manganese pipeline



Source: Firebird ASX announcement dated 11/11/21 and 1/12/21

# OTHER PROJECTS

## HILL 616 – Building the manganese pipeline



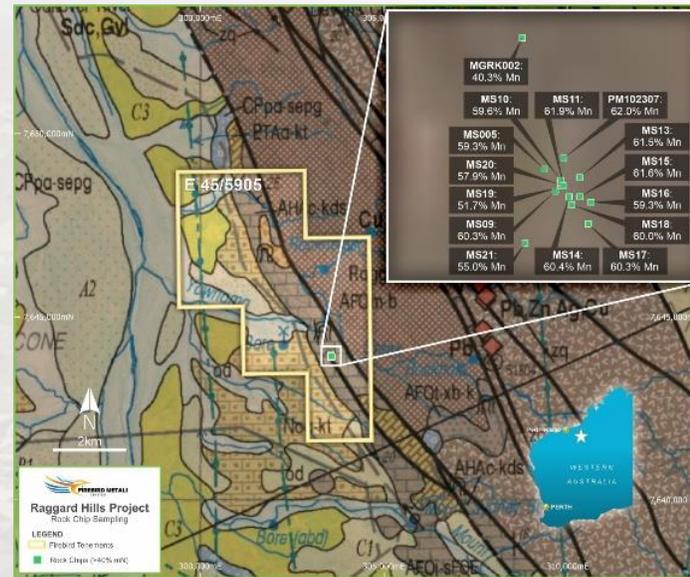
Source: Firebird ASX announcement dated 11/11/21 and 1/12/21

## DISRAELI



- ◆ Previous exploration suggests Manganese in this area is responsive to geophysics techniques
- ◆ Multiple high grade rock chips of up to 51.1% Mn
- ◆ Exploration strategy to focus on DSO type mineralisation
- ◆ Plans to use modern geophysics techniques along with geological mapping & rock chip sampling to identify further drilling targets

## RAGGED HILLS



- ◆ Successful direct licence application
- ◆ 15 of 19 rock chip samples above 40% Mn, with majority over 50% Mn
- ◆ Limited drilling conducted on prospect, with only a single RC hole drilled outside of high-grade area
- ◆ Located 33km NNE of the high-grade Woodie Woodie Manganese Mine
- ◆ Project to complement Firebird's high-grade DSO strategy

Refer ASX release dated 15/6/21

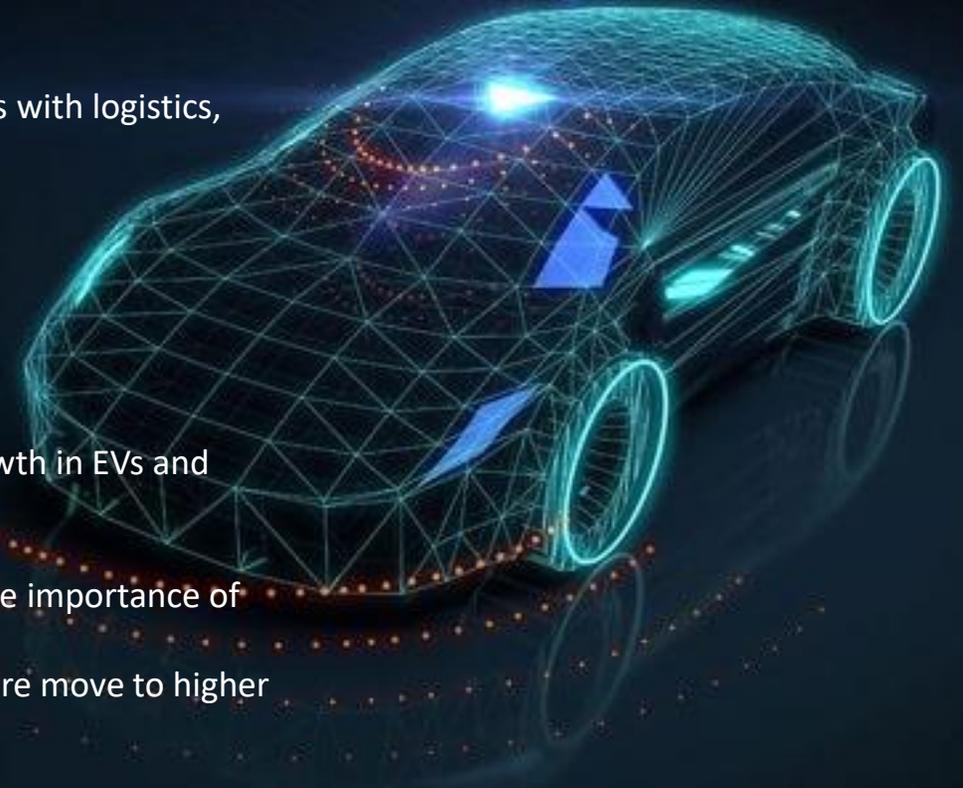
Source: Firebird Prospectus dated 27/1/2021, section 5.2.2 (a)

# Manganese Markets



## GROWING THEMATIC & STRATEGIC ADVANTAGE

- ◆ Systematic shift in global manganese markets over past decade
  - ◆ Declining number of high quality, global manganese deposits
  - ◆ Chinese domestic ore production declining, combined with lower production grade
  - ◆ South Africa, the largest exporter of Manganese globally, continues to face challenges with logistics, labour and fiscal regime
- ◆ Growing push to source 'ethical' manganese from jurisdictions with low sovereign risk
- ◆ Government infrastructure investment providing a strong platform for future steel demand
  - ◆ No substitute for manganese in steel production
- ◆ Manganese importance as a critical battery mineral growing rapidly, leveraging forecast growth in EVs and battery storage
- ◆ EV demand driving Li-ion utilisation has significantly enhanced investor understanding on the importance of manganese
  - ◆ Volkswagen, Tesla and Stellantis Group all have announced over last 12 months a future move to higher manganese content cathodes for EV's, typically for the volume segment production



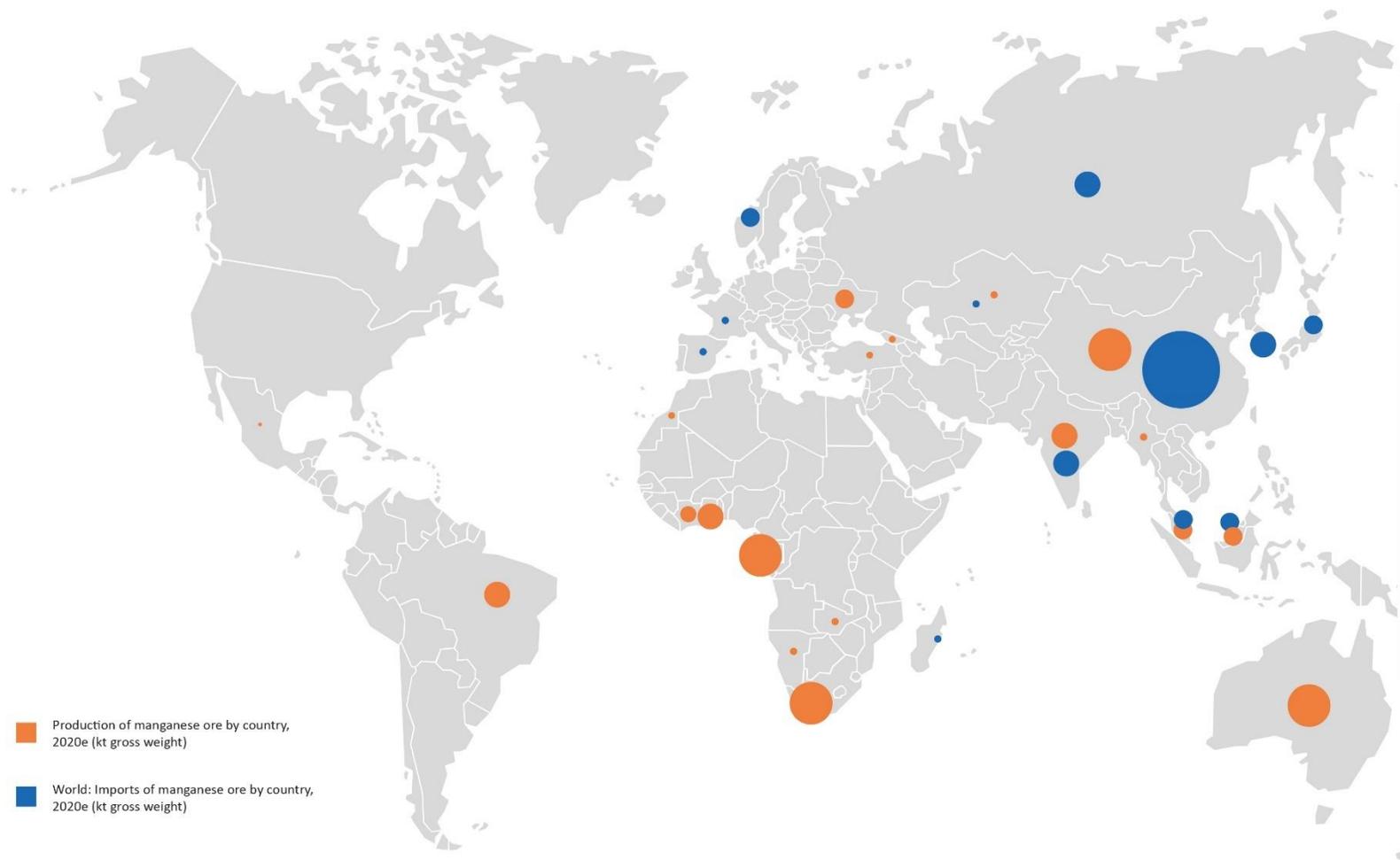
# MANGANESE MARKET

◆ No substitute for manganese in steel production



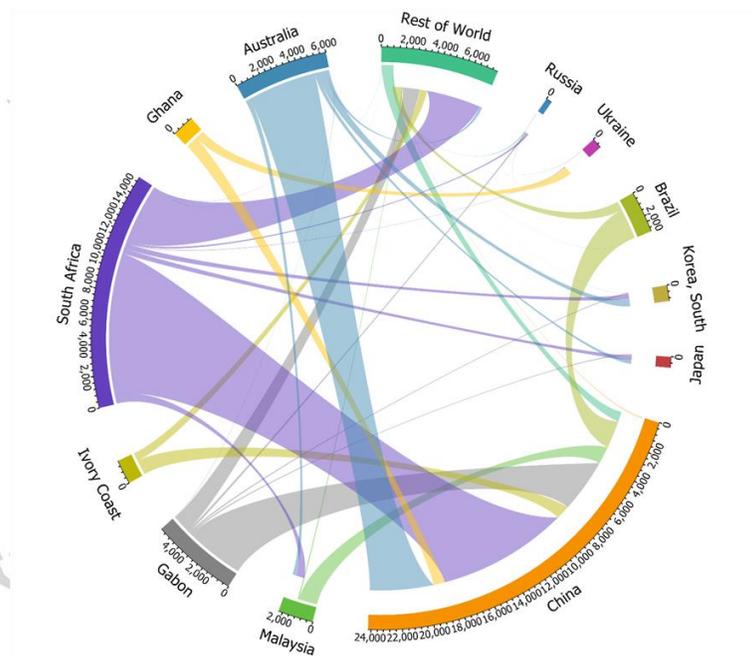
2<sup>nd</sup> LARGEST CONSUMPTION IS IN BATTERIES

# MANGANESE SEABORNE TRADE



- Production of manganese ore by country, 2020e (kt gross weight)
- World: Imports of manganese ore by country, 2020e (kt gross weight)

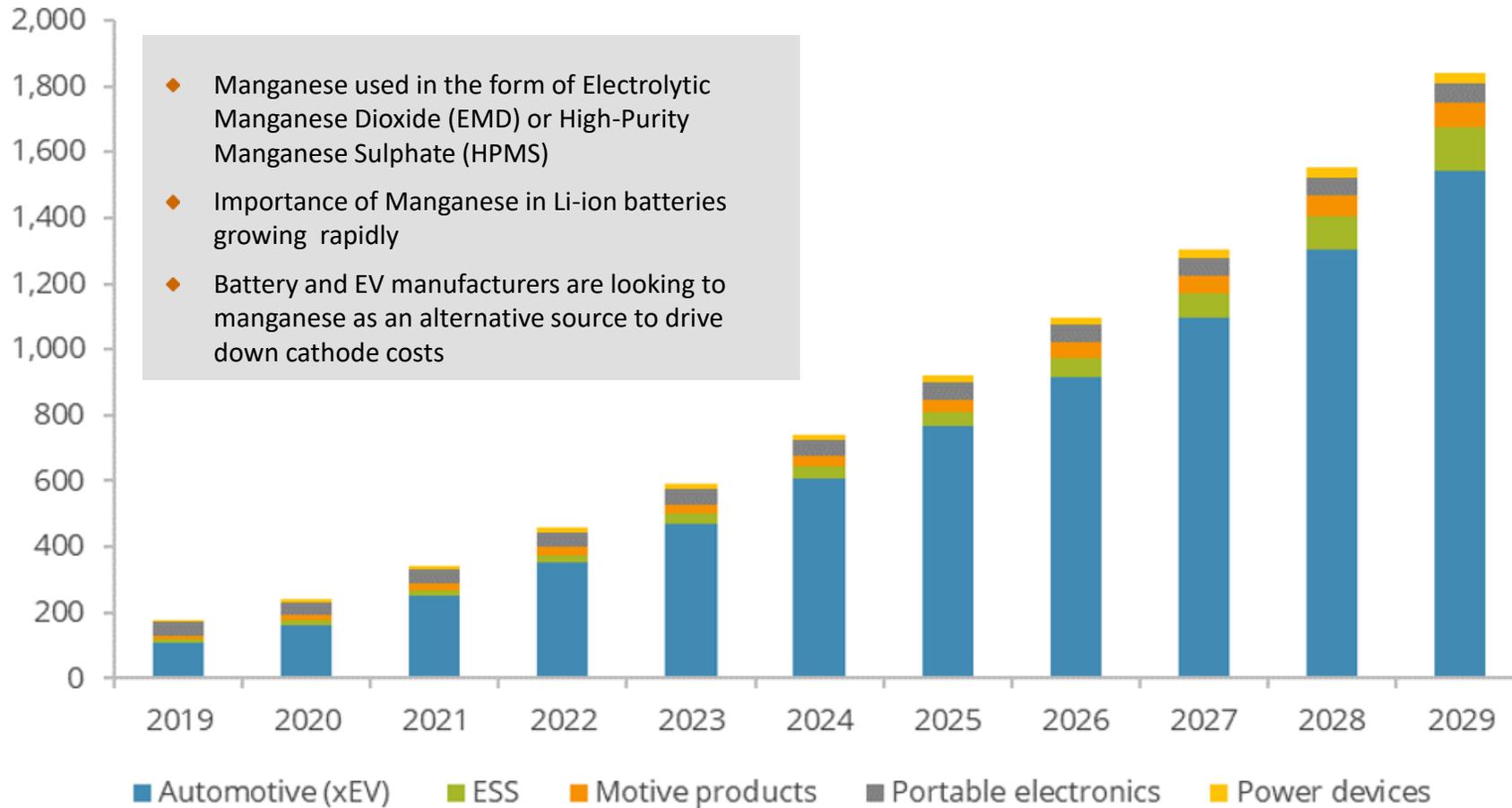
Trade flow for manganese ore, 2020e (Mt gross weight)



Source: Roskill & UN Comtrade

# MANGANESE MARKET – Batteries

World Li-ion battery use by market, 2019-2029 (GWh)



- ◆ Manganese used in the form of Electrolytic Manganese Dioxide (EMD) or High-Purity Manganese Sulphate (HPMS)
- ◆ Importance of Manganese in Li-ion batteries growing rapidly
- ◆ Battery and EV manufacturers are looking to manganese as an alternative source to drive down cathode costs

“Manganese consumption in lithium-ion batteries is expected to skyrocket in the coming 10 years, because of the enormous rise of lithium-ion battery demand.... Roskill has upgraded its forecast, which now see Mn demand in lithium-ion growing at 23%py between 2020-2030.

Demand is set to reach nearly 380,000 mt by 2030, from 48,000mt in 2020”

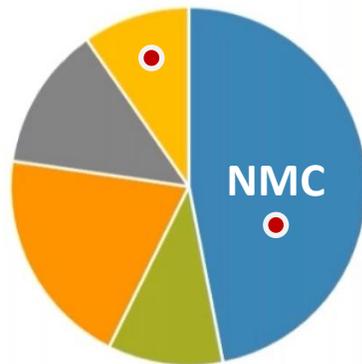
International Manganese Institute

Source: Volkswagen Power Day presentation, Roskill & IMnI Manganese in Lithium-Ion Batteries report

# MANGANESE MARKET – Li-Ion Batteries - Understanding The Manganese Potential

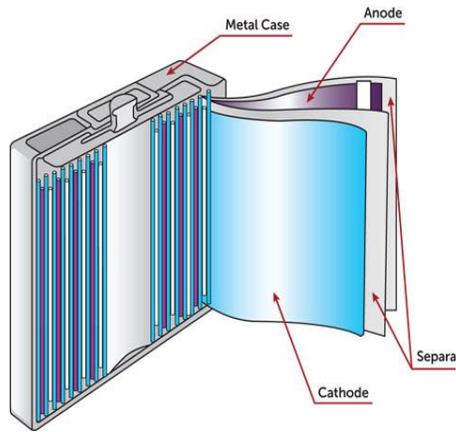
NMC (Nickel, Manganese & Cobalt) is the dominant EV Li-ion battery cathode chemistry today .....and will continue to be so for at least the next two decades

Global output of cathode materials by chemistry in 2020



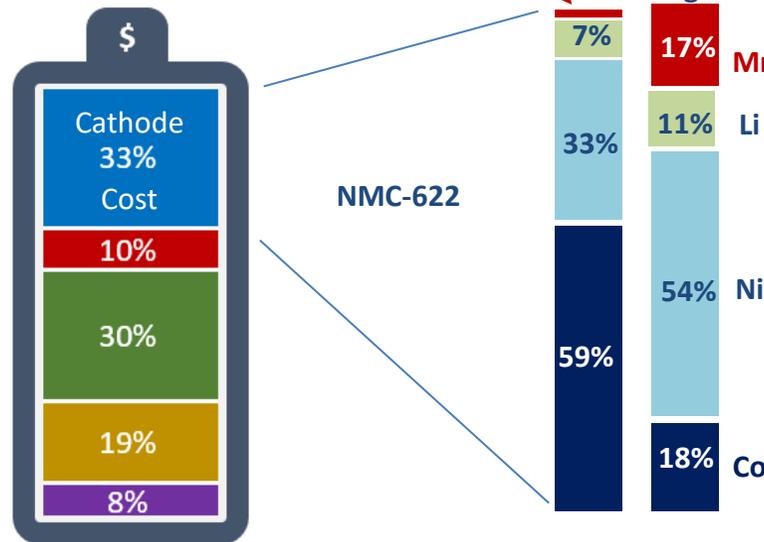
■ NCM ■ NCA ■ LFP ■ LCO ■ LMO

● = Mn use

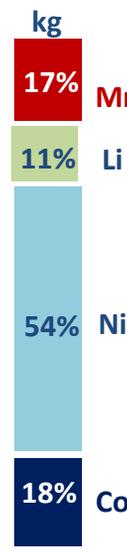


Source: enovix.com

Manganese accounts for only 1-2% of the cost of cathode materials



NMC-622



By weight **Manganese is as important as Cobalt** in a modern Li-ion EV battery... **but it is considerable cheaper!**

**Mn < 0.6% of battery pack cost**

Source: Cairn ERA, American Manganese Inc., Bloomberg, CPM  
Price assumptions: Li \$17/kg; Co \$36/lb; Ni \$14,700/mt; Mn 2.03/kg [EMM 99.7%]



■ LCO ■ NCA ■ NMC 1-1-1 ■ NMC 5-3-2 ■ NMC 6-2-2 ■ NMC 3-7-0 ■ NMC 8-1-1 ■ LNMO ■ LMO ■ LFP ■ OTHER

# LOOKING AHEAD



## BUILDING A FUTURE MANGANESE PRODUCER

- ◆ Exciting project portfolio led by advanced, flagship Oakover Project
- ◆ Significant total Inferred Mineral Resources to 121mt over two projects:
  - Oakover Project – Inferred JORC 2012 Mineral Resource estimate of 64 Mt @ 10% Mn\*
  - Hill 616 Project - Inferred JORC 2012 Mineral Resource estimate of 57.5 Mt @ 12.2% Mn\*
- ◆ Speed-to-market strategy, targeting DSO via simple beneficiation production and early cash generation
- ◆ Excellent progression of Rapid Development Program to assess low capital, fast start up potential at Oakover
  - ◆ 233 holes for ~ 10,000m RC drill program complete
  - ◆ Ore Sorting and Met testing well underway
  - ◆ Program to provide key inputs for the expected commencement of PFS in Q4 2021
- ◆ Building a pipeline of Manganese Projects
- ◆ Rising importance of Manganese in Li-ion batteries
- ◆ No substitute for manganese in steel production



## CONTACT

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e-mail: [admin@firebirdmetals.com.au](mailto:admin@firebirdmetals.com.au)