

# HANNANS

22 November 2021

Shareholders  
Hannans Ltd  
Level 12, 197 St Georges terrace  
Perth, West Australia

Dear Shareholders

## Updated Presentation

We're pleased to provide the attached presentation, "Lithium Battery Recycling in the Nordic Region (Updated)".

Please note today's presentation replicates the presentation released to ASX on 5 November 2021 but for:

- inclusion of the following paragraph on page 11:  
"The financial information on this page was sourced from multiple sources, including page 6 of Neometals Ltd (ASX:NMT) ASX release dated 7 May 2021 which itself referenced pricing information sourced from Fastmarkets (Cobalt, Nickel, Manganese – Spot) and HIS Markit Trade Data (Lithium – Spot) and Neometals Management (Copper Products – Forecast). Information pertaining to battery cell composition and product recoveries for cobalt 82%, nickel 83%, lithium 82%, copper 88% combined manganese 78% were sourced from Neometals Management. Information on multiples was sourced from BMO Capital Markets research note on Li-Cycle dated 9 September 2021. Information on this page represents a combination of industry wide metrics plus metrics released by the licensor of the recycling technology; and is not financial forecast information that shareholders should be relying on."
- removal of the statement on page 11 "potentially strong margins circa +100%" because this is forecast is not compliant with the ASX Listing Rules.

This ASX announcement has been authorised for release by Damian Hicks, Executive Director,

Best regards,



Damian Hicks  
Executive Director



[www.hannans.com](http://www.hannans.com)



[@Hannans\\_Ltd](https://twitter.com/Hannans_Ltd)



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# HANNANS

## **Lithium Battery Recycling in the Nordic Region (Updated)**

[www.hannans.com](http://www.hannans.com)

ASX:HNR

22 November 2021

# Summary

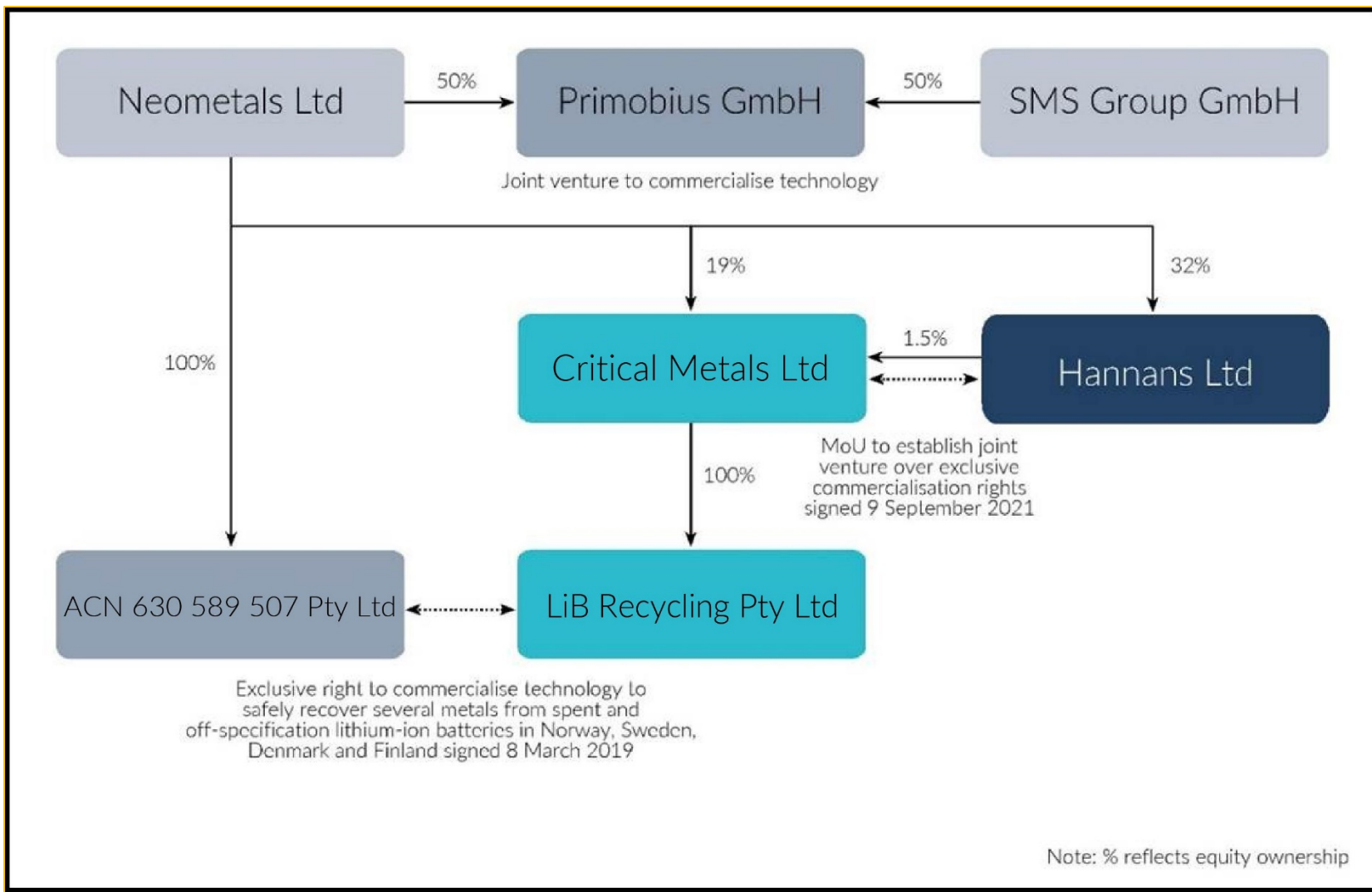
- Hannans aims to recover high purity metals from scrap and spent lithium batteries (LiB) in Norway, Sweden, Denmark and Finland (Nordic region). The LiB recycling technology is being proven, is scalable, safe and sustainable.
- The Nordic region has plans for four Gigafactories, has the highest electric vehicle (EV) penetration rates in the world, a strong recycling culture and raw material security of supply concerns. Hannans is constantly evaluating rapid growth options for its LiB recycling ambitions.
- Hannans will focus on securing LiB feedstock and obtaining permits before making a final investment decision on the first plant.



# Transaction Summary

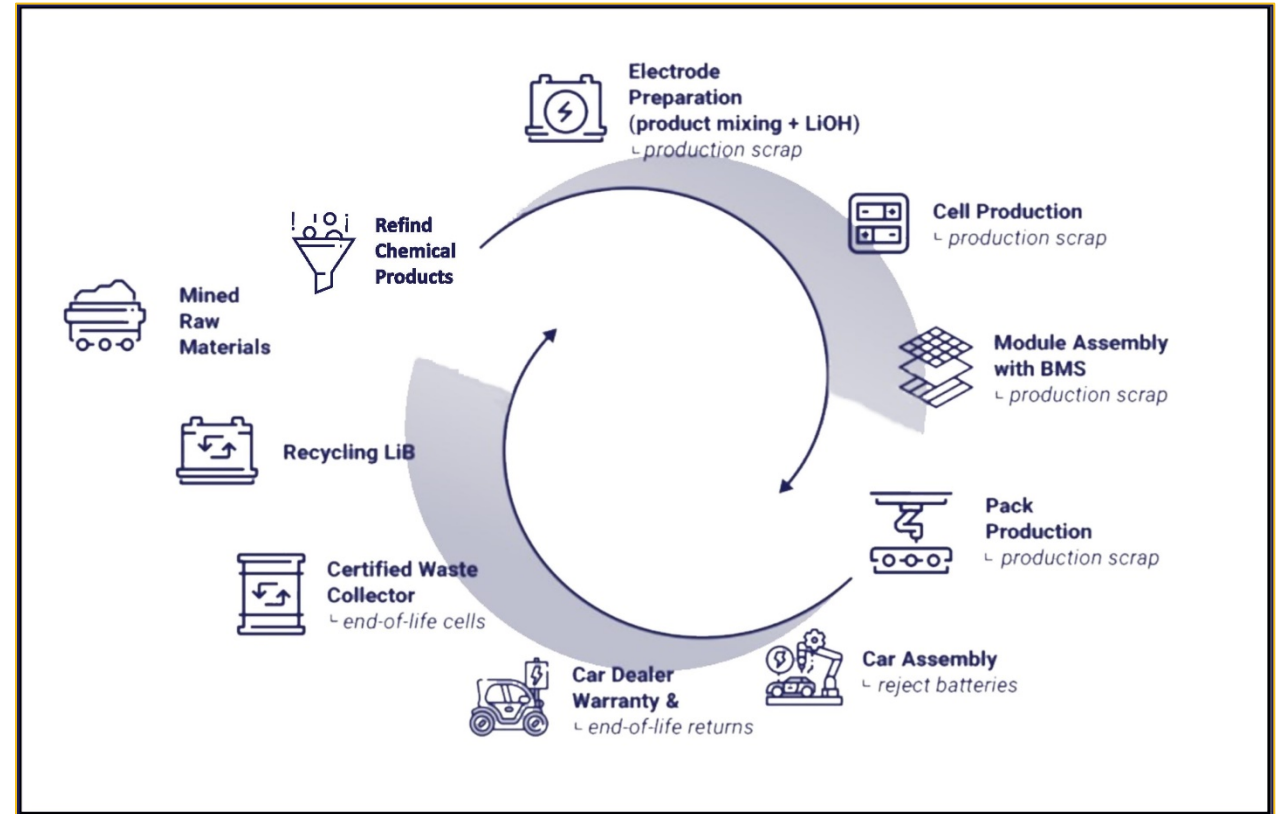
- Critical Metals Ltd (Critical) holds an exclusive license to commercialise a LiB recycling technology in the Nordic Region in consideration for payment of a gross revenue royalty to Neometals Ltd (ASX:NMT).
- Hannans signed a Memorandum of Understanding (MoU) with Critical on 9 September 2021 providing it with the right to earn a 50% interest in each and every LiB recycling plant developed in the Nordic region by funding activities through to a final investment decision (FID) with respect to each plant.
- Hannans alone has the right to decide whether to make a positive FID. If Critical elects not to contribute Hannans has the right to 100% of that particular plant.

# Technology Ownership



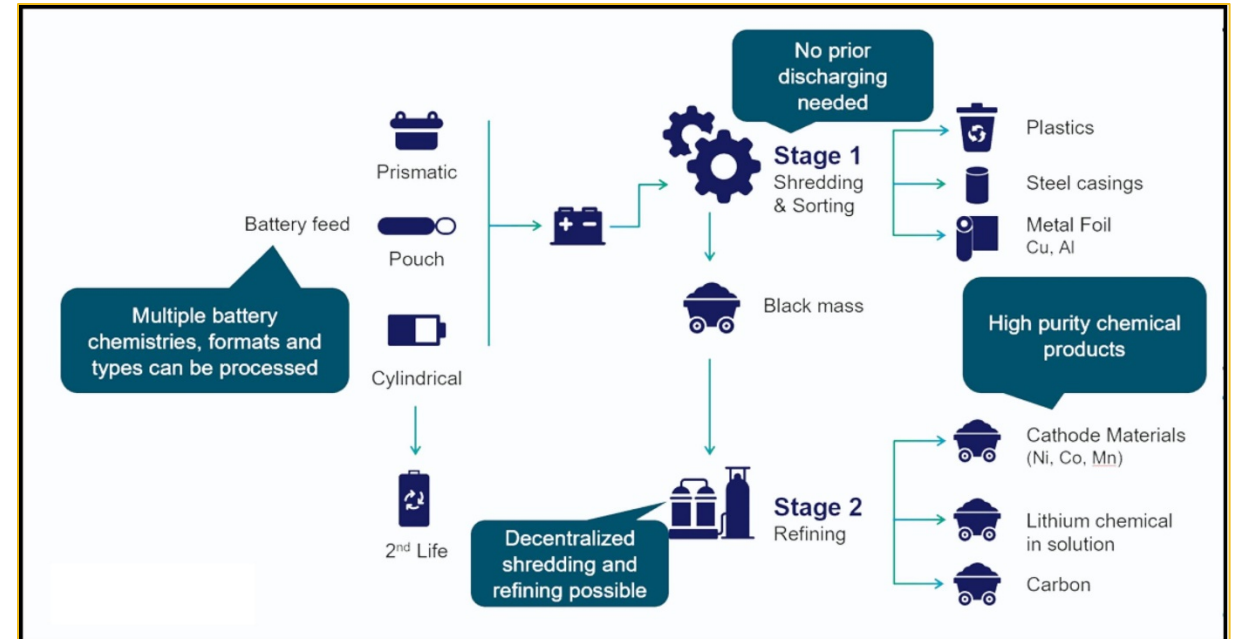
# What is LiB Recycling?

- Lithium-ion batteries (LiB) are energy storage devices comprising several metals including nickel, cobalt, lithium and manganese (and others) - the growth in LiB is massive.
- If not handled correctly LiB explode, are flammable and toxic – not suitable for long term storage at end-of-life or for disposal in landfill.
- LiB recycling involves shredding, sorting and refining to make the batteries safe and to recover valuable metals for reuse.
- LiB recycling using environmentally and socially acceptable processes is the only way.



# LiB Recycling Technology

- Developed over 5 years and owned by ASX listed Neometals Ltd.
- Shredding and sorting (Stage 1) and refining (Stage 2) components of the technology are capable of processing multiple LiB chemistries, formats and types.
- Stage 1 products include mixed cathode and anode “black mass” plus steel, plastic and foil.
- Stage 2 products include high purity battery chemicals including nickel, cobalt, lithium and manganese sulphates.

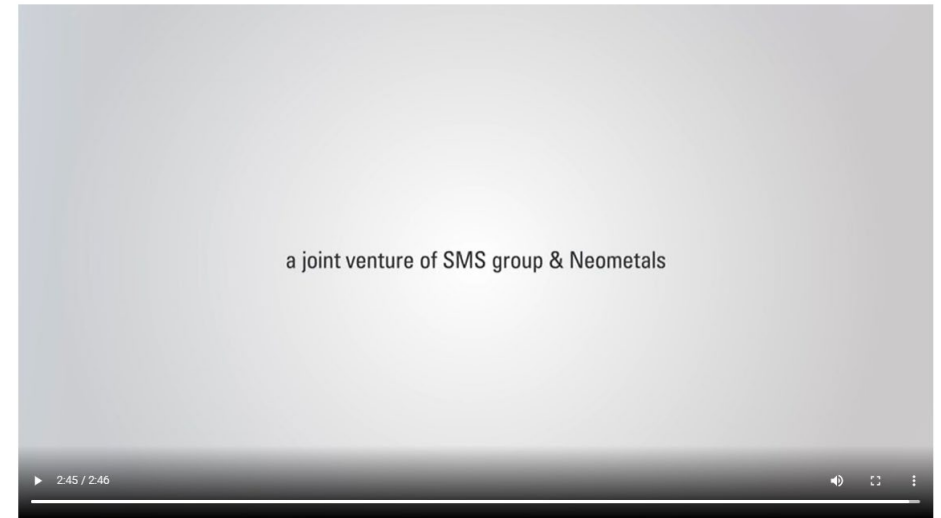




# Neometals' commercialisation plan through Primobius GmbH JV with SMS group

- Primobius to deploy Stage 1 in commercial operation early 2022, processing 10 tonnes per day of LiB feedstock. Primobius to complete current 1 tonne per day demonstration plant trial in November 2021 as part of a feasibility study into construction of a 50 tonne per day (20,000 tpa) operation.
- Click [here](#) for a fly through of the Primobius demonstration plant flowsheet.
- Click [here](#) for a walk through on the Primobius plant on German TV.
- Click [here](#) for the Primobius Press Conference 2021.

## PRIMOBIUS DEMONSTRATION PLANT HILCHENBACH, GERMANY THE FUTURE OF LI-ION BATTERY RECYCLING





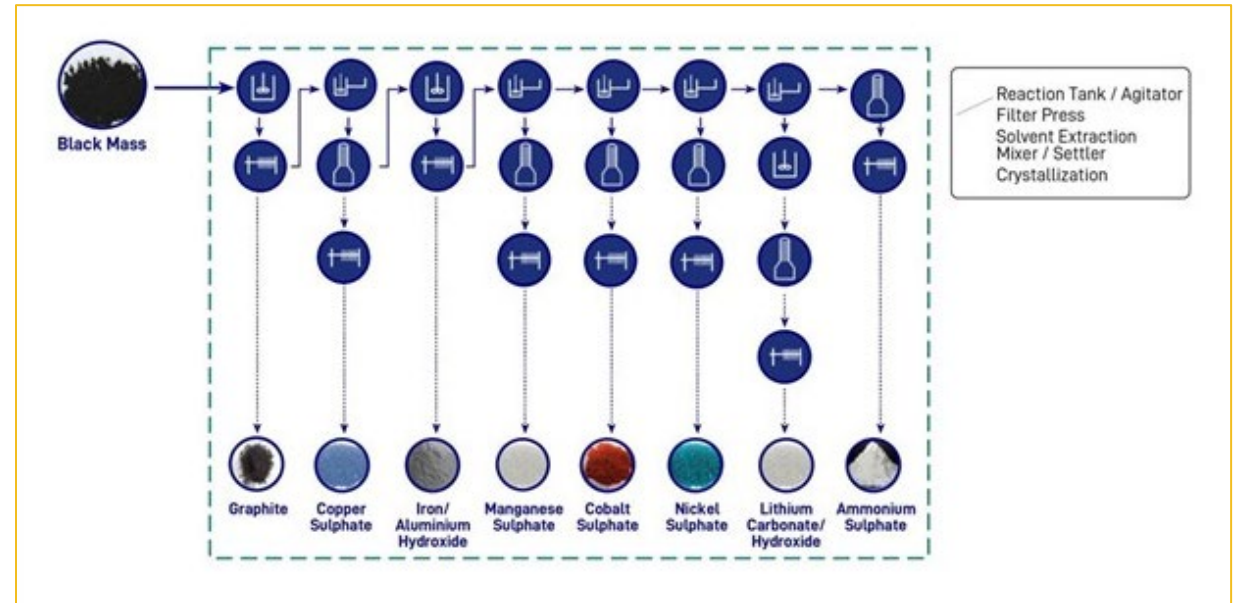
# What's recovered from a LiB?

By weight an LiB generally comprises:

- Cathode: 30%
- Anode: 15%
- Electrolyte: 10%
- Aluminium & copper: 35%
- Steel case, binders and plastics: 10%

Elemental breakdown of an LiB is generally:

- Lithium: 7%
- Oxygen: 33%
- Ni/Mn/Co (811): 48%/6%/6%
- Ni/Mn/Co (622): 36%/11%/12%



## Market size in Nordic region

- Europe Union (EU) does not have enough battery metals to meet its growth ambitions.
- Every source of battery metals will be retained in the EU and the loop will be closed.
- Security of raw material supply and the circular economy are key themes for the EU.
- LiB recycling focus in the short-medium term is on scrap LiB from the cell manufacturing process.

Year	2024	2025	2026	2027	2028	2029	2030
Production (GWh)	40	73	96	112	112	112	112
10% scrap rate	4	7.3	9.6	11.2	11.2	11.2	11.2
LiB waste (kt)	20	36.5	48	56	56	56	56

Table: Expected GWh in Nordic region

Estimates only, based on publicly stated information

## Nordic sweet spot

- Four Gigafactories planned in the Nordics means access to scrap is a possibility
- Strong connection with social and environmental responsibility
- Strong recycling culture
- Strong legislative regimes
- Limited access to battery metals from mining
- Focussed on circular economy and recycling to ensure supply chain resilience.

Market	EV (000s)	EV mix (%)
Germany	368	23
France	163	16
UK	153	15
Italy	80	8
Norway	78	83
Sweden	76	40
Denmark	30	28
Finland	18	28
Total	202	

Table: West European new plug-in passenger car registrations January – July 2021.  
Combines both battery EVs (BEV) and Plug-in hybrid EVs (PHEV)

# Key financials for LiB recycling analysis

- LiB waste feedstock mix and cost
- Scrap rates and product recall rates
- LiB life
- Collection rates
- Recycling and reuse rates of LiB
- Recoveries and efficiencies of refining technologies
- Commodity prices
- Legislative reforms

- Raw material security
- Variable include feedstock type, recovery and efficiency rates and commodity prices
- Processing, reagents, labour, energy, collection, transportation
- Estimated LiB recycling revenue ~\$6,000/t – NMC811\*
- Estimated cost range <\$2,000/t\*
- Listed LiB recycling companies are trading on multiples of 15 \* EBITDA

\*The financial information on this page was sourced from multiple sources, including page 6 of Neometals Ltd (ASX:NMT) ASX release dated 7 May 2021 which itself referenced pricing information sourced from Fastmarkets (Cobalt, Nickel, Manganese – Spot) and HIS Markit Trade Data (Lithium – Spot) and Neometals Management (Copper Products – Forecast). Information pertaining to battery cell composition and product recoveries for cobalt 82%, nickel 83%, lithium 82%, copper 88% combined manganese 78% were sourced from Neometals Management. Information on multiples was sourced from BMO Capital Markets research note on Li-Cycle dated 9 September 2021. Information on this page represents a combination of industry wide metrics plus metrics released by the licensor of the recycling technology; and is not financial forecast information that shareholders should be relying on.

All financial numbers are US dollars.

# Barriers to entry

- Time and resources required to research and develop an industrial scale, fully integrated, safe and compliant LiB recycling process.
- Securing permits to operate.
- Requirement for a steady stream of consistent LiB feedstock to underwrite business.
- Means to fund and build plants to the high standard required by OEM.
- Companies currently offering LiB recycling solutions in the Nordics, and those potentially planning entry into the Nordics include: Fortum, Hydro Volt, Northvolt Revolt, Li-Cycle, Stena Recycling, AkkuSer, and Redwood Materials.

# Characteristics of LiB recycling winners

- Hydrometallurgical recycling process: high recoveries, low GHG emissions, low H<sub>2</sub>O consumption, format agnostic.
- Secure LiB feedstock supply: Short to medium term will come from Gigafactory scrap.
- Scalable: must be scalable, ramp up quickly to handle scrap now and end of life in the future, leads to increased profitability and improved margins.

# Hannans LiB Recycling Focus

- Completion transaction in Nordic region.
- Investigate options for rapid growth expansion.
- Secure feedstock via relationship with OEM.
- Identify sites for Stage 1 plants in Sweden, Norway, Denmark and Finland.
- Commence site permitting: 8 to 12 month process.
- Build first Stage 1 plant and sell “black mass”.
- Identify site for Stage 2 plant in either Sweden, Norway, Denmark or Finland.
- Commence site permitting: 8 to 12 month process.
- Build Stage 2 plant and sell refined battery chemicals in full compliance with EU Battery Regulations by 2025.



# Proposed News Flow\*

Deliverable	Date
Hannans signs Memorandum of Understanding with Critical Metals	9 September 2021
Neometals Ltd announce completion of fully integrated shredding, sorting and refining demonstration plant trial	End November 2021
Hannans shareholders vote on transaction	26 November 2021
Neometals Ltd announce 10 tpd LiB disposal service – further validation of technology and business model	1 <sup>st</sup> Quarter 2022
Hannans to source LiB feedstock	1 <sup>st</sup> Quarter 2022
Hannans obtain permits to operate 1 <sup>st</sup> Plant	4 <sup>th</sup> Quarter 2022
Hannans makes final investment decision and executes plant supply agreement	4 <sup>th</sup> Quarter 2022
Hannans commence construction of 1 <sup>st</sup> Plant	4 <sup>th</sup> Quarter 2022
Start-up 1 <sup>st</sup> Plant	4 <sup>th</sup> Quarter 2023

\* Subject to change

# Directors



## **Jonathan Murray, Independent Non-Executive Chairman**

- Director of Hannans Ltd (2010).
- Partner of Steinepreis Paganin
- Principal legal practice areas include equity capital markets, takeovers, project acquisitions and divestments, corporate governance, commercial law and strategy.
- Currently Non-Executive Chairman of Critical Metals Ltd and Errawarra Resources Ltd.



## **Amanda Scott, Non-Executive Director**

- Director of Hannans (2016) residing in Sweden.
- Exploration Manager for Hannans Group (2008-2016).
- Consulting Geologist with 13 years experience.
- Extensive experience in the Yilgarn and Pilbara regions of Western Australia and the Caledonides and Kiruna regions of Scandinavia exploring for gold, copper, nickel, PGEs, iron and manganese.



## **Markus Bachmann, Non-Executive Director**

- Director of Hannans Ltd (2012) residing in Switzerland.
- Corporate finance professional.
- Founding partner of Craton Capital (cratoncapital.com)
- Currently Non-Executive Chairman of Critical Metals Ltd.



## **Damian Hicks, Executive Director**

- Director of Hannans Ltd (2002).
- Financial, legal and compliance qualifications.
- Principal responsibilities includes strategy formulation, team development, deal origination & execution, stakeholder relationships and capital raising.
- Developing opportunities in Sweden, Norway and Finland since 2008. Currently Executive Director Critical Metals Ltd and all group subsidiary companies.



## **Clay Gordon, Non-Executive Director**

- Director of Hannans (2016).
- Bachelor of Applied Science (Geology) and a Master of Science (Mineral Economics). Member of the AusIMM and AIG.
- +25 years' experience in senior roles (operational, management and corporate) within large and small resource companies active in a range of commodities within Australia, Africa and Southeast Asia.

# Contact Details

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