



**High Value Fertiliser (SOP)** to feed the world  
and  
**High Purity Alumina (HPA)** to build batteries,  
smartphones and LEDs

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## INTRODUCTION

- Errawarra has rights to two emerging technologies in two rapid growth markets – high value fertiliser (SOP) and High Purity Alumina (HPA) – **right place, right time**
- There is a cluster of ASX listed companies seeking to access these two markets via new technologies and projects
- An opportunity exists for Errawarra to seek a public listing (IPO) and be re-rated bringing it into alignment with the market capitalisation of ASX companies focused on SOP and HPA
- Prefeasibility Study completed on SOP and Scoping Study completed on HPA
- Errawarra is an audited unlisted public company with 20M shares on issue and 1,700 shareholders
- Errawarra will now open a seed capital round to raise \$750,000



# HIGHLIGHTS



## SOP Process

- Prefeasibility Study completed
- Carbon capture and utilisation process
- Scalable business model
- Early production opportunity
- Low CAPEX

## HPA Process

- Scoping Study completed
- Test plans developed
- Feedstock secured
- Proof of concept report due June 2018
- By-product SOP

## RATIONALE FOR BOTH SOP AND HPA

- Demand for both SOP and HPA is forecast to grow globally
- The world's population is growing, population density is increasing and there is less fertile ground available for farming
- SOP supplies vital nutrients (potassium) to high value crops (nuts, vegetables and 'leafy greens') required to feed the world – the price of SOP is **US\$575/t**
- Research into the potential to extract potassium from hard rock mineral deposits in Western Australia ( $\text{KAlSi}_3\text{O}_8$ ) identified an opportunity to economically extract High Purity Alumina ( $\text{Al}_2\text{O}_3$ ) from these same deposits
- The world's increasing use of LED devices and reliance on technology requires additional supply of HPA – the price of 99.99% HPA is **US\$25,000/t**
- A valuable by-product of the HPA process is SOP
- Errawarra therefore has exposure to potential processing technologies that can produce both SOP and HPA for the global markets and these are opportunities that need to be capitalised on

## WHAT IS SOP (SULPHATE OF POTASH)?

- SOP<sup>1</sup> is a high value fertiliser that provides nutrients to high value crops such as nuts (30%), vegetables (25%), fruits (15%), tea and tobacco (30%)
- Importantly SOP contains very low levels of chloride, is highly concentrated, enhances yield and quality, extends shelf life and improves taste
- SOP currently sells for approx. **US\$575/t**
- The global market for SOP is ~7Mtpa and ~70,000tpa is consumed in Australia annually (100% is imported)
- Market grade specifications for SOP are deemed to be >50% potassium oxide (K<sub>2</sub>O), > 17.5% sulphur (S) and <1.5% chloride (Cl)
- 50% of the SOP used globally is manufactured via the Mannheim Process, the balance is extracted from ancient salt lakes
- Eight (soon to be nine) ASX listed companies are focussed on the production of SOP from ancient salt lakes

<sup>1</sup>: Also referred to as sulphate of potassium and potassium sulphate and its chemical description is K<sub>2</sub>SO<sub>4</sub>

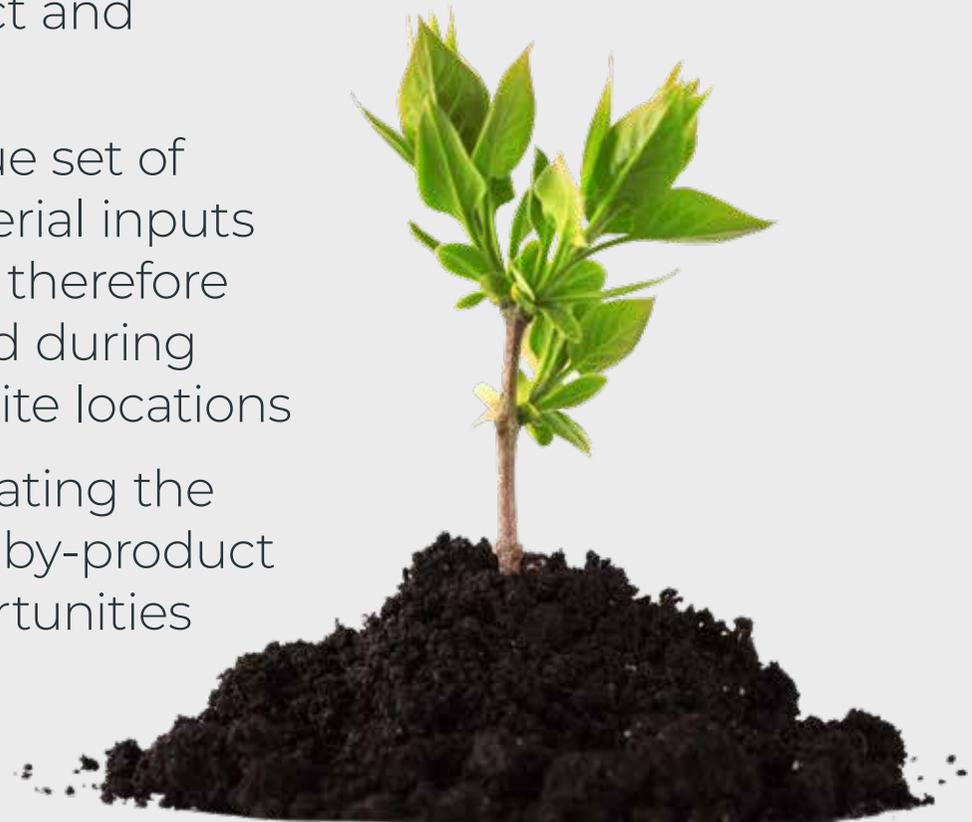
## SOP PROCESS – THE FIRST OF ITS KIND

- 50% of the world's SOP is manufactured via the Mannheim Process 3.5 mtpa, a process that generates hydrochloric acid (HCl) as a by-product
- **Errawarra aims to capture a percentage of the 'Mannheim market' by manufacturing SOP via a proprietary process without any HCl by-product**
- Errawarra's proven process uses carbon dioxide, ammonia, water, gypsum and lower value potash (MOP), a process that generates lime and calcium chloride as by-products
- Errawarra process can achieve > 50% K<sub>2</sub>O (potassium oxide) and market specifications for sulphur and chloride
- Errawarra completed a Scoping Study (+/-35% accuracy) in 2016, achieved market grade specifications for SOP in 2017 and completed a Prefeasibility Study (+/-25% accuracy) in March 2018



## RAPID GROWTH **GLOBAL BUSINESS MODEL**

- Errawarra plans to independently produce SOP and license the SOP Process
  - Errawarra will seek to establish production facilities close to suppliers of lower value potash to reduce transport costs
  - Errawarra will seek to license its process to producers of lower value potash that are seeking to increase their product and revenue mix
- Each geographical market will have a unique set of cost drivers in relation to the main raw material inputs (ammonia, gypsum, water and potash) and therefore a detailed market analysis will be completed during the Bankable Feasibility Study to optimise site locations
- Increasingly strict environmental laws regulating the disposal of hydrochloric acid produced as a by-product of the Mannheim Process may create opportunities for Errawarra to gain market share



## ADVANTAGES OF ERRAWARRA SOP

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- Modular design that can be located in multiple jurisdictions enabling rapid growth of business model
- Absorbs carbon dioxide (CO<sub>2</sub>) so positive environmental impact
- No mine life limitations
- No land tenure issues associated with mining
- No remote access issues associated with developing projects in very remote locations
- Not reliant on, or exposed to weather patterns
- Low CAPEX (but correspondingly higher OPEX)
- Low human resource requirements with facility operated by few workers
- Small 'footprint'

# PRODUCTION **OPPORTUNITY**

- PFS study based on proposal to build commercial scale 40,000 tpa 'demonstration production facility' close to producer of lower value potash (MOP) and SOP customer/s
- Production facility will be modular and scalable
- Production facility will showcase technology to investors, financiers, licensees and customers
- Site location to be determined as part of Bankable Feasibility Study
- Production target 2021/2022 (subject to a range of outcomes)



## NEXT STEPS

- Commence Bankable Feasibility Study (BFS) to optimise process and costs, identify range of sites for location of production facility and produce bulk samples for analysis by potential customers and licensees
  - BFS to be completed within 12 months of commencement
- Subject to outcome of BFS, secure funding and offtake agreements prior to completing front end engineering design and build first production facility for SOP using the Errawarra Process
- Continue research and development to expand product suite

# WHAT IS **HIGH PURITY ALUMINA (HPA)**?

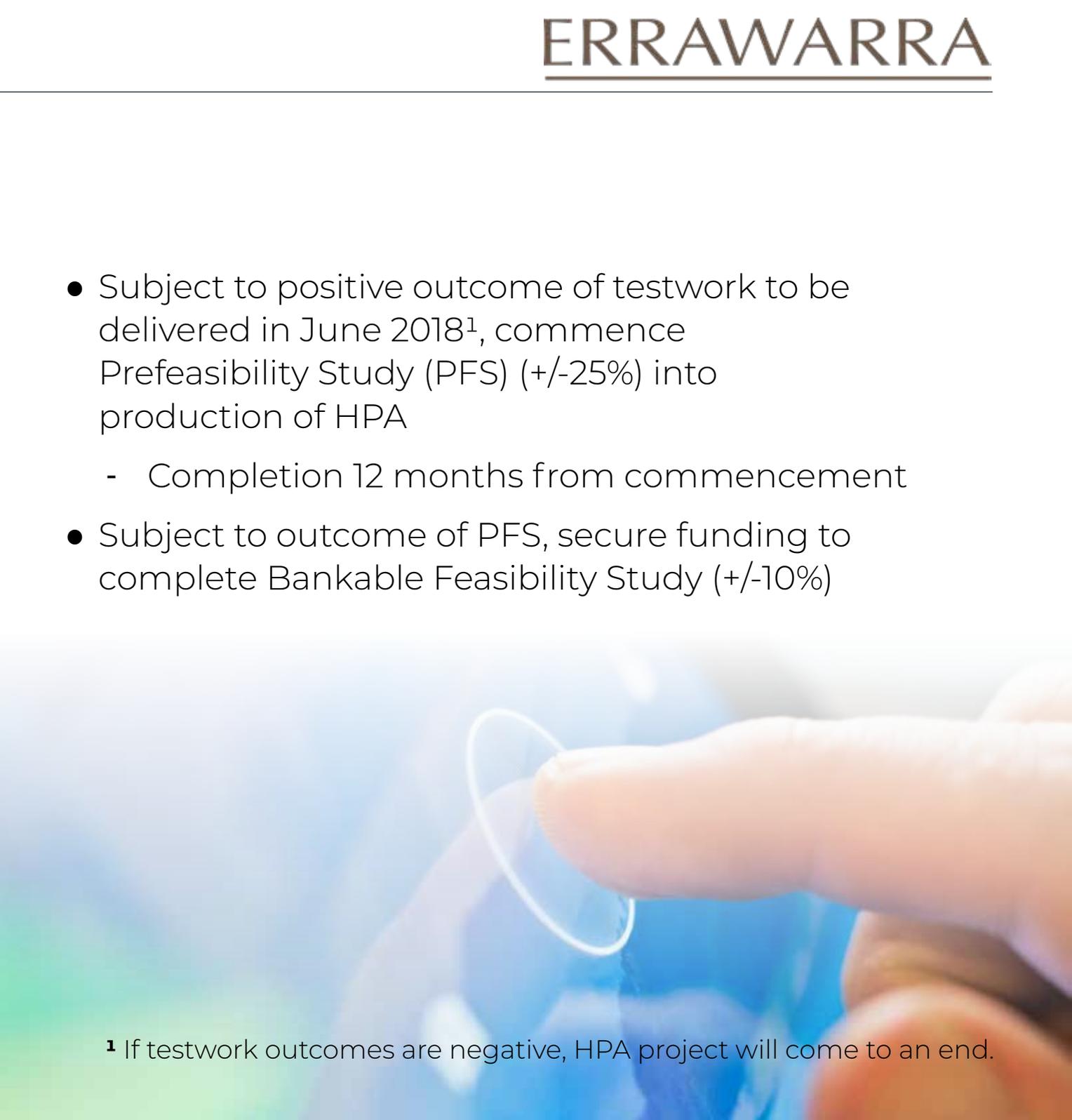
- HPA is the pure form of aluminium oxide ( $\text{Al}_2\text{O}_3$ )
- **Errawarra's focus is on production within the largest segment of the HPA market, being 4N HPA (99.99%  $\text{Al}_2\text{O}_3$ ) which commands a sale price of approx. US\$25,000/t**
- HPA is technically very challenging to produce due to the requirement to ensure no deleterious elements are present in the product
- HPA is used to manufacture sapphire glass which is utilised in the production of LED (light emitting diode) products (54%), separators in lithium ion batteries and scratch resistant glass for smartphones, tablets and watches
- The majority of the world's HPA (>80%) is produced in the Asia Pacific region by China, Japan and South Korea
  - Four ASX listed companies are currently focussed on the production of HPA



## HPA PROCESS

- Errawarra's proprietary process is being developed by metallurgical consulting firm METS ([www.metsengineering.com](http://www.metsengineering.com)) to extract HPA from potassium feldspar rocks
- Testwork and Scoping Study (+/-35%) completed March 2018 confirms HPA economics (valuable by-product is SOP)
- Tenement applications have been lodged over two historic feldspar mines in Western Australia to provide feedstock for HPA process
- Proof of concept work targeting production of commercial grade HPA samples due for completion June 2018 – stop/go point
  - Testwork being undertaken by the Commonwealth Scientific and Industrial Research Organisation (CSIRO)

## NEXT STEPS



- Subject to positive outcome of testwork to be delivered in June 2018<sup>1</sup>, commence Prefeasibility Study (PFS) (+/-25%) into production of HPA
  - Completion 12 months from commencement
- Subject to outcome of PFS, secure funding to complete Bankable Feasibility Study (+/-10%)

<sup>1</sup> If testwork outcomes are negative, HPA project will come to an end.

# BOARD OF DIRECTORS & COMPANY SECRETARY



**Jonathan Murray**

Non-Executive Chairman

- Director of Errawarra Resources Ltd (2012)
- Director of Hannans Ltd (2010) and Critical Metals Ltd (2016)
- Partner of Steinepreis Paganin (2001)
- Principal legal practice areas include equity capital markets, takeovers, project acquisitions and divestments, corporate governance, commercial law and strategy.



**Damian Hicks**

Executive Director

- Director of Errawarra Resources Ltd (2012)
- Director of Hannans Ltd (2002), Critical Metals Ltd (2016) and Corporate Board Services Pty Ltd
- Financial, legal and compliance qualifications
- Principal responsibilities includes strategy formulation, deal origination & execution, stakeholder relationships and capital raising.



**Markus Bachmann**

Non-Executive Director

- Director of Errawarra Resources Ltd (2012)
- Director of Hannans Ltd (2012) and Critical Metals Ltd (2016)
- Corporate finance professional
- Founding partner of Craton Capital (*cratoncapital.com*)
- Craton Capital awarded Fund Manager of the Year at the Mining Journal's "Outstanding Achievement Awards" during December 2010



**Mindy Ku**

Company Secretary

- Company Secretary of Errawarra Resources Ltd (2014)
- Managing Director of Corporate Board Services Pty Ltd (2016)
- Bachelor of Science in Computing from the University of Greenwich, United Kingdom; Member of CPA Australia
- 15 years' international experience in finance, compliance and governance across multiple jurisdictions.

# KEY CONSULTANTS



## Peter McEwen

Fertiliser Industry Expert

- Director of the Fertiliser Industry Federation of Australia (1997 – 2010) and Chairman (2003 – 2007)
- Bachelor of Science with First Class Honours in Chemistry from University of Western Australia, a Graduate Diploma in Engineering (Chemical) from WAIT (now Curtin) and Graduate of the AICD Company Directors Course
- Founder and Managing Director of private company Agri-Access Australia Pty Ltd (2012 – present), previously Chairman and director of AACL Holdings Ltd (2009 – 2012), Chief Executive Officer of Sumitomo Group company Summit Fertilizers (1992 - 2010) and Chairman & Managing Director of Summit Rural (WA) Pty Ltd (2005 – 2010)
- Various management positions with Wesfarmers CSBP Ltd (1980 – 1992)



## Damian Connelly

Project Management & Engineering

- Chartered Professional Engineer with more than 45 years of experience
- Principal Engineer of METS Engineering and oversees a staff of 60 Engineers, author of over 90 technical papers
- Bachelor of Applied Science from Adelaide University, a Fellow of the Australasian Institute of Mining and Metallurgy (AusIMM) and Fellow of Engineers Australia (FIEAust)
- Experience in plant operations feasibility studies, detailed design, construction and commissioning, and all unit operations
- Internationally recognised specialist in mineral processing having worked in North and South America, South East Asia, Africa and Europe – extensive experience in the gold, copper, lead, zinc, uranium and iron ore industries

## INDUSTRY CONSULTANTS

PRODUCT	PROJECT MANAGEMENT	CHEMICAL PROCESS & CHEMICAL ENGINEERING	CHEMICAL ANALYSIS	MECHANICAL ENGINEERING	SOP PRODUCT SPEC.	LEGAL	FINANCIAL, TAXATION, COMPLIANCE & GOVERNANCE
SOP	METS	Curtin University	Nagrom	Haycorp Consulting	Agri-Access Australia	Griffith Hack	Corporate Board Services
		METS	Agrifood	Midas Engineering		Steinepreis Paganin	Stanton Partners
		CSIRO					Deloitte
HPA	METS	CSIRO					

# CORPORATE OVERVIEW

## Current Structure

Incorporated	2012
Type	Unlisted public company
Background	Spun out from Hannans Ltd (ASX:HNR) in 2012
Fully paid ordinary shares (after consolidation)	20,000,000
Options	TBC
Top 5 holding	45%
Top 20 holding	63%

## Proposed Structure at IPO

	Shares	%	%	%
Founders	20,000,000	73	40	
Seed shares (deemed 10c issue)	7,500,000	27	15	55
IPO Shares (deemed 20c issue)	22,500,000		45	45
Total shares	50,000,000		100	100

# SEED RAISING - USE OF FUNDS

	Amount (AUD)	Notes
Capital Raise	750,000	7.5m shares at 10 cents each
SOP BFS – Phase I	150,000	Commence Bankable Feasibility Study for SOP process. Balance of costs to be funded from IPO.
HPA PFS – Phase I	105,000	Phase 1 – confirm potential to produce high purity Alumina (HPA) – stop/go. If positive balance of costs to be funded from IPO.
SOP and HPA Study Instalments	150,000	Outstanding creditors
Loan Repayments	175,000	Repayment of loan that has funded testwork and working capital since 2016
Financial Reporting & Compliance	20,000	Accounting, Audit and ASIC fees
Pre-IPO Costs	80,000	Prospectus costs and ASX fees
Pre-IPO Working capital	70,000	

# PROPOSED IPO - USE OF FUNDS<sup>1</sup>

## AUD

Cash (AUD)	70,000
\$ 4.5M IPO less costs	4,162,500
Total cash	4,232,500
Enterprise value	5,767,500

Allocation of funds	Year 1	Year 2		Total
	AUD	AUD	%	AUD
Opening cash				4,232,500
SOP BFS	850,000	250,000	30	
HPA PFS & BFS	375,000	1,000,000	33	
HPA JORC Resource	200,000	200,000	9	
Board & Management	250,000	250,000	12	
Compliance & Corp. Admin	350,000	350,000	17	
Total	2,025,000	2,050,000	100	4,075,000
Closing cash (AUD)				157,500

<sup>1</sup>: Subject to outcome of HPA testwork report to be delivered June 2018, refer slide 14.

# SOP COMPANIES

	<b>Name</b>	<b>ASX Code</b>	<b>Mkt Cap (\$M)</b>	<b>Approx. Enterprise value (\$M)</b>
SOP	Highfield Resources	HFR	232	167
	Agrimin	AMN	128	119
	Danakali	DNK	180	165
	Salt Lake Potash	SO4	98	88
	Kalium Lakes	KLL	65	51
	Reward Minerals	RWD	28	25
	Australian Potash	APC	25	24
	Errawarra <sup>1</sup>	TBC	10	6
	Parkway Minerals	PWN	7	3

1: If Errawarra lists on ASX with the capital structure in this presentation

\* As at 6 April 2018

Source: ASX and company websites

# HPA COMPANIES

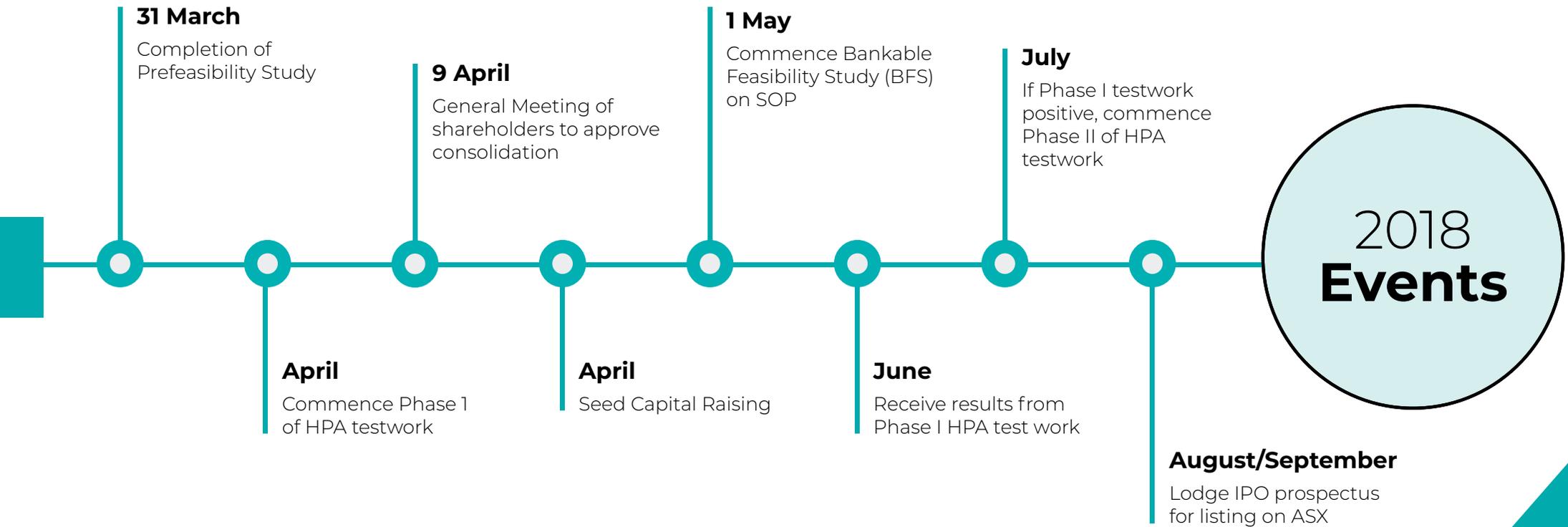
	<b>Name</b>	<b>ASX Code</b>	<b>Mkt Cap (\$M)</b>	<b>Enterprise value (\$M)</b>
HBA	Collerina Cobalt	CLL	68.6	66.6
	Altech Chemicals	ATC	70.4	61.4
	Hill End Gold	HEG	15.5	12.5
	FYI Resources	FYI	22.6	18.6
	Errawarra <sup>1</sup>	TBC	10	6

1: If Errawarra lists on ASX with the capital structure in this presentation

\* As at 6 April 2018

Source: ASX and company websites

## TIMELINE



## CONCLUSION

- Two proprietary technologies in two rapid growth markets
  - high value fertiliser (SOP) and High Purity Alumina (HPA)
  - **right place, right time**
- Subject to a successful listing on ASX, an opportunity exists for Errawarra to be re-rated bringing it into alignment with the market capitalisation of ASX companies focused on SOP and HPA
- SOP and HPA processes complimentary



## CONTACT DETAILS

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[@SOPandHPA](https://twitter.com/SOPandHPA)

# APPENDIX – SOP AND HPA TIMELINE

## 2002

Basic Reid Process™ plant to combine CO<sub>2</sub>, ammonia and gypsum

## 2003 - 2010

Reid Process - completion of bench top tests, refinement of plans and drawings

## 2011

\$1M Seed Capital raised by Reid Systems Pty Ltd to commercialise Reid Process™

## May 2012

Demonstration Plant Completed

## May 2013

Curtin University confirms Reid Process chemical balancing works and products produced

## September 2016

METS deliver Verification & Due Diligence Report

## May 2016

Errawarra complete Scoping Study

## March 2016

Global Patent Applications Lodged

## February 2016

Commercialisation Agreement signed with Errawarra

## September 2015

Positive Preliminary Report as to Patentability

## October 2014

International Patent Application Lodged

## July 2017

METS deliver Crystallisation Testwork Report

## September 2017

METS deliver Potassium Sulphate Purification Testwork Report

## October 2017

METS engaged to deliver Pre-Feasibility Study (PFS)

## October 2017

METS and CSIRO engaged to complete proof of concept testwork on extracting potassium from hard rock

## March 2018

METS deliver PFS