SA Explorers
Conference 2018



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The information in this presentation that relates to Exploration Targets, Exploration Results, Mineral Resources or Ore Reserves is based on information provided by Minotaur Exploration and compiled by Rhoderick Grivas, a Competent Person, who is a Member of The Australasian Institute of Mining and Metallurgy. Mr Grivas is Chairman of Andromeda Metals. Mr Grivas has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Grivas consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

### Outline

- 1. The Andromeda transformation
- 2. The Poochera Project
- 3. Geology, drilling and defined resource
- 4. Kaolin and halloysite mineral properties
- 5. Product and Target Markets
- 6. Marketing & offtake agreements
- 7. Bulk sampling and processing trials
- 8. Existing Infrastructure
- 9. Resource model update
- 10.Mine Plan
- 11. Processing Options
- 12.Summary



### **The Andromeda Transformation**

#### Vision

From a gold/copper explorer to a sustainable industrial minerals producer

#### **Primary Project Development Focus**

Poochera Halloysite-Kaolin Project JV with Minotaur Exploration

#### **Exploration Portfolio**

- Projects covering 6,102 km<sup>2</sup>
- 22 exploration licences
- Located in SA, QLD, WA and the NT

#### Other Projects - minimising holding costs and maximising value

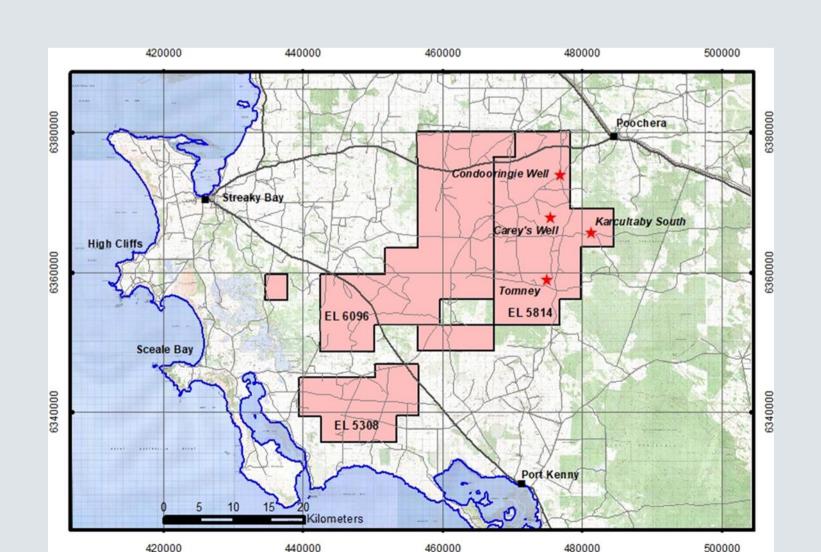
- Drummond (Gold) JV with Evolution Mining
- Moonta (Copper) JV negotiations at advanced stage
- Wudinna (Gold) JV with Lady Alice Mines
- Rover (Gold) Seeking JV
- Pilbara (Gold) Native Title agreements being negotiated



# Poochera Project

### Overview

- World class halloysite-kaolin deposit
- Estimated short timeframe to production
- Long mine life
- Indicative off-take agreements with Chinese companies (>200,000 tpa processed product)
- Commercial scale approval trials planned for direct shipping ore
- Testwork proved a 99.99% (4N) High Purity Alumina (HPA) feedstock
- Opportunities in emerging for halloysite nanotechnology applications

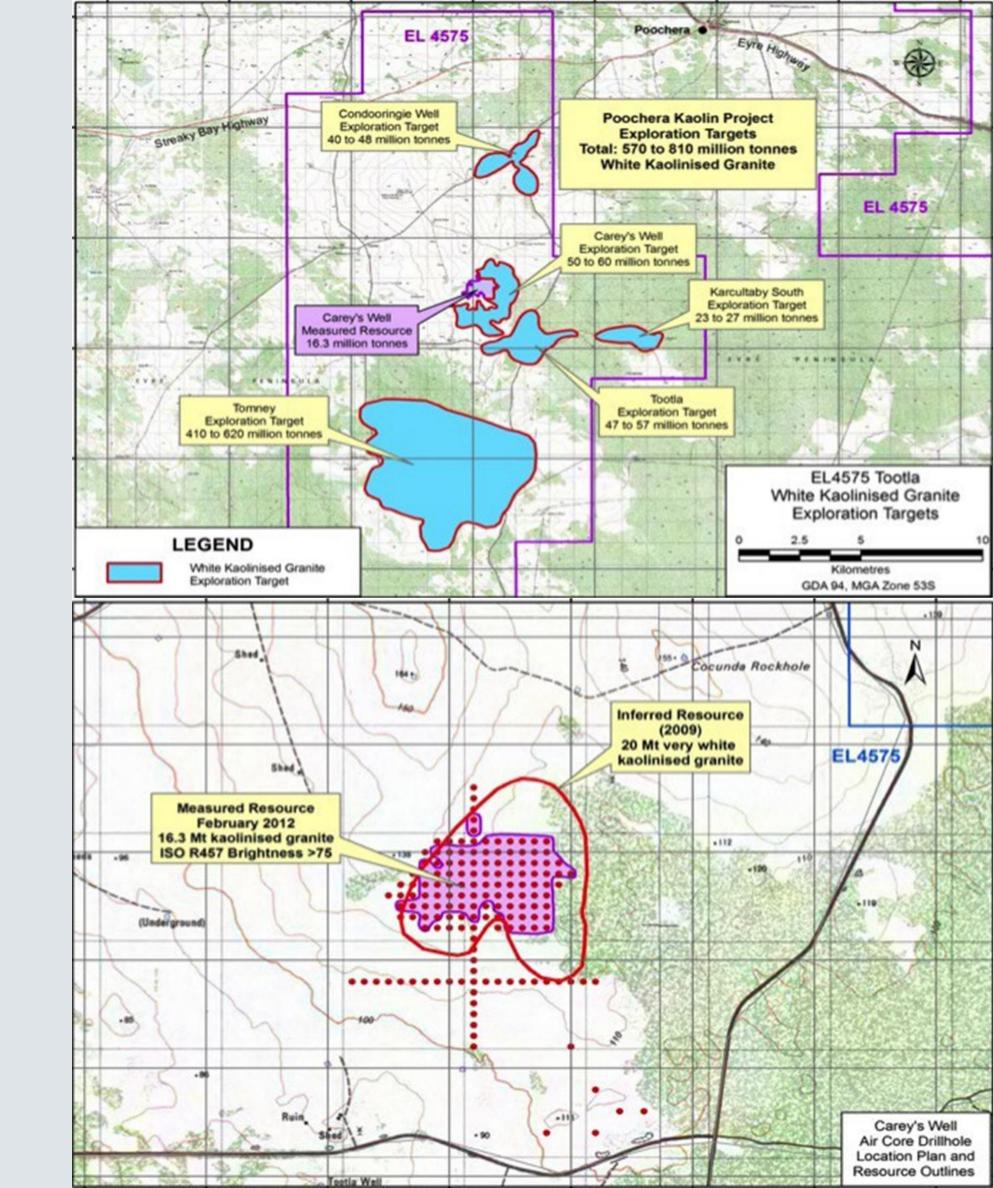




### **Defined Resource**

- JORC 2012 Resource estimate for Carey's Well
- Total 23.9Mt of "bright white" kaolinised granite
- ISO Brightness R457 cut-off of 75 (< 45 micron product)

The Carey's Well material is a naturally occurring hybrid blend of halloysite and kaolin



# **Mineral Properties**

Main Constituent: Kaolinite/Halloysite Blend

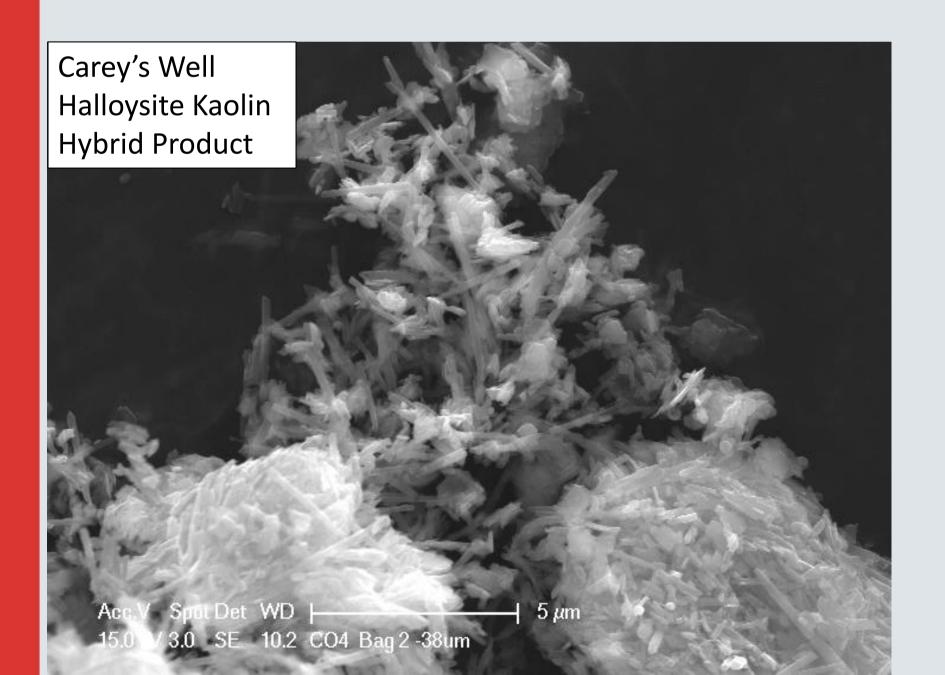
Minor: Mica, Quartz, Feldspar

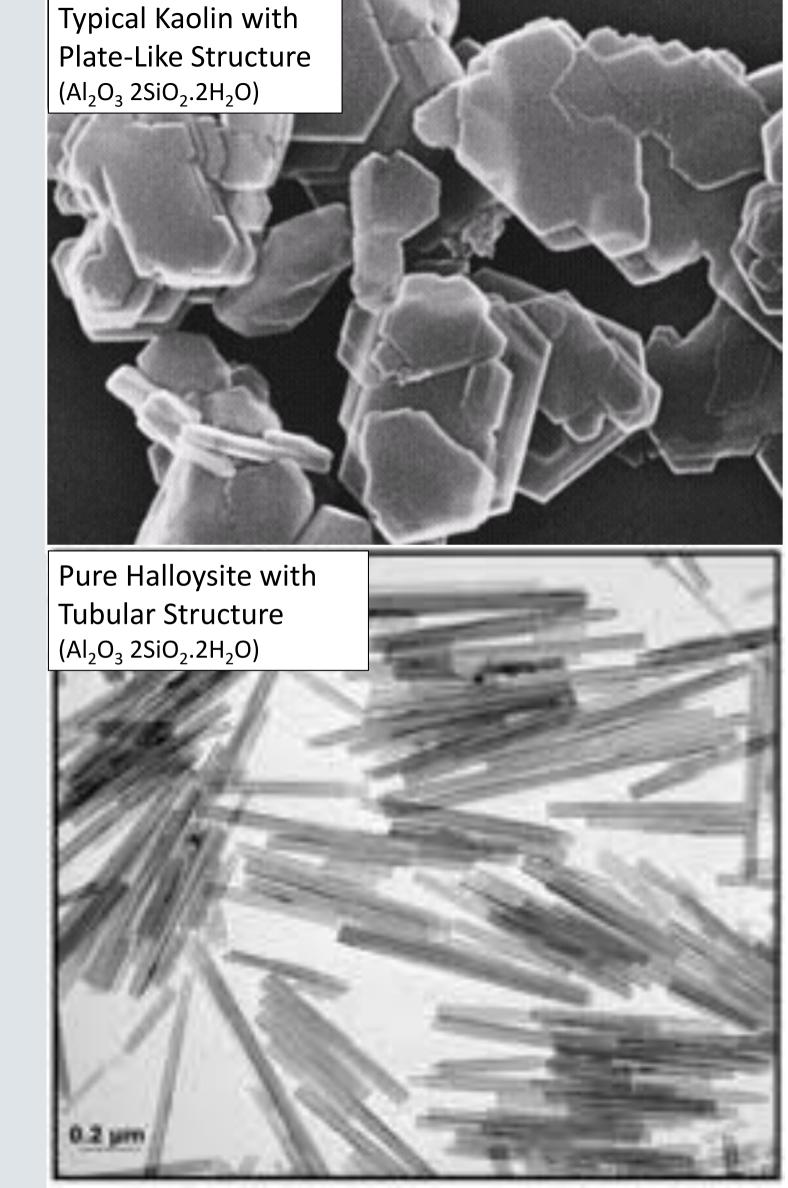
**Aspect Ratio:** 8/1 - 100/1

**Specific Gravity:** 2.6

**Refractive Index:** 1.56

MOH Hardness: 2.5





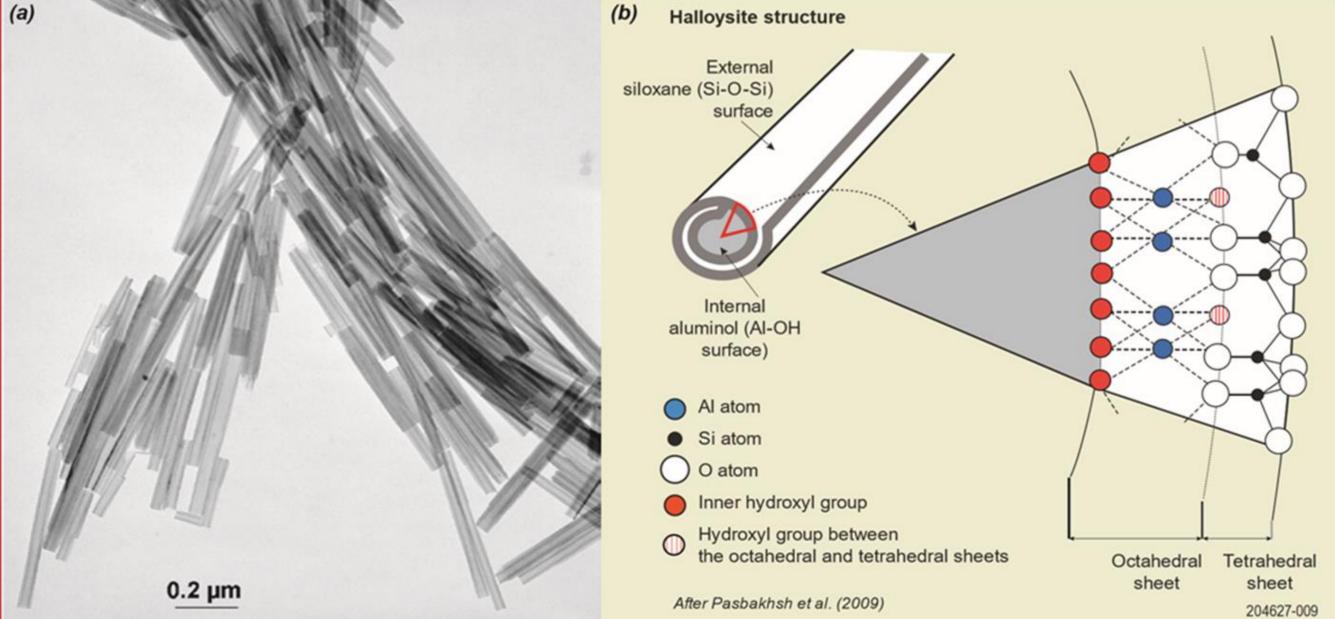
# Halloysite

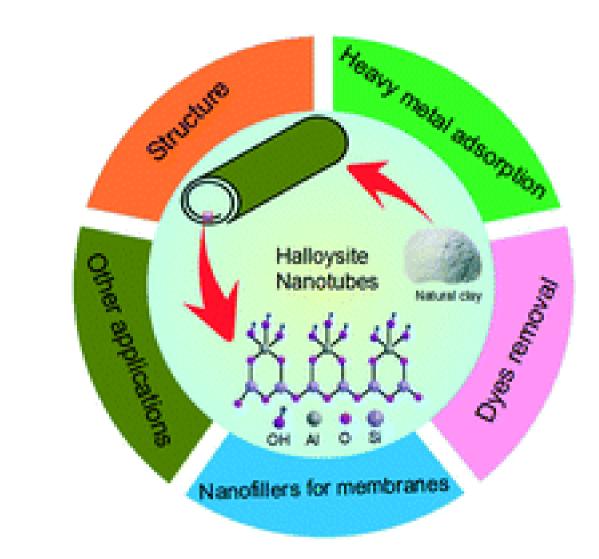
Halloysite is a rare 'tubular shaped' derivative of kaolin that has a wide variety of industrial uses

#### **Relative Commercial Values**

- Pure Kaolin approx. \$200/t
- Kaolin/Halloysite Hybrid approx. \$500 \$1000/t
- Pure Halloysite approx. \$3000/t upwards

# Halloysite Kaolin with Tubular Structure (b) Halloysite structure

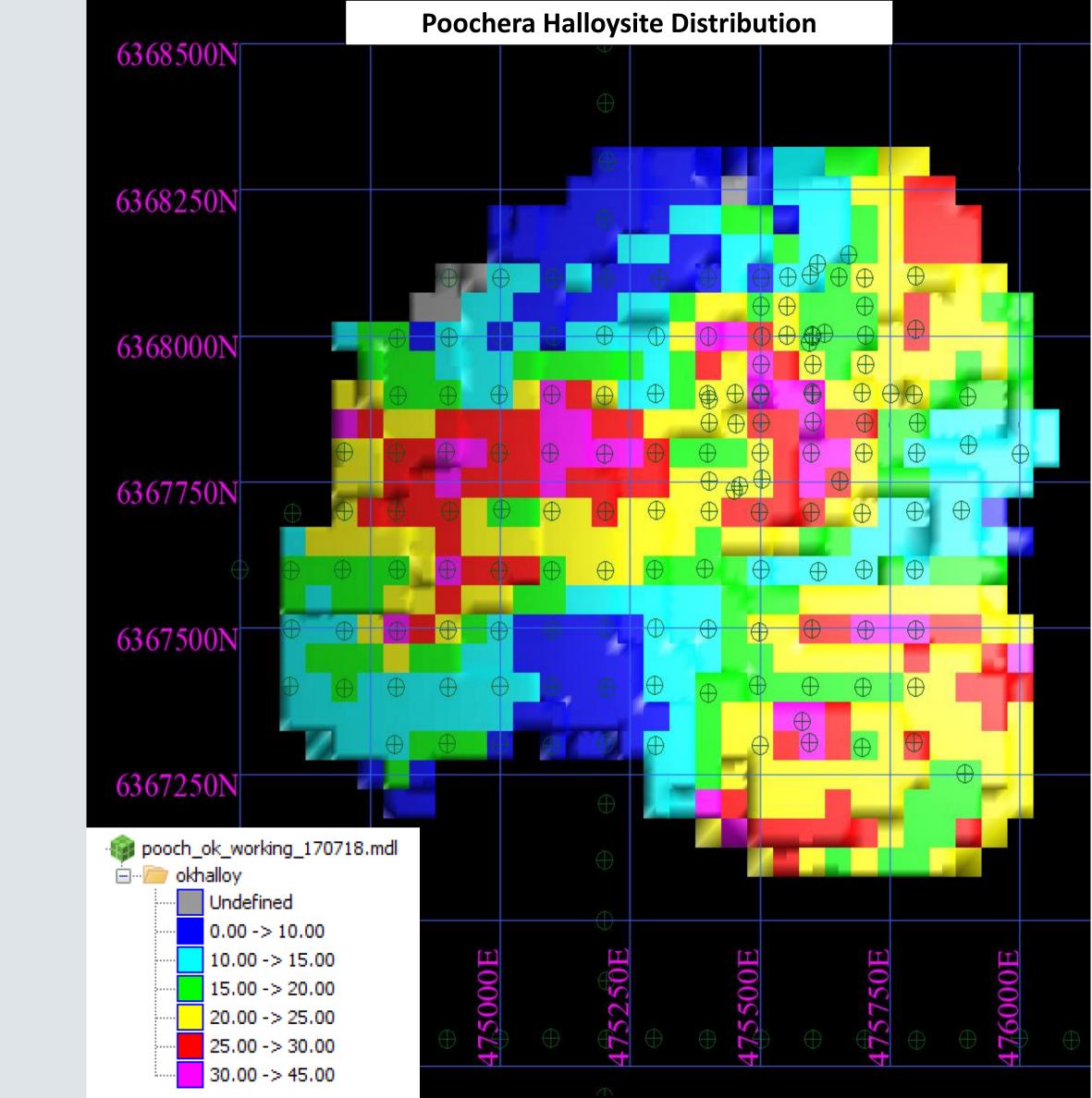






### **Resource Model**

- Resource model update
- Characterise the halloysite component
- Exploration drilling of high purity halloysite regions



# **Product & Target Markets**

for the halloysite kaolin market

#### **Main Mature Established Markets**

- Ceramics for high-quality porcelain
- Catalysts for Fluid Catalytic Cracking (FCC)

#### **New and Emerging Markets**

- High Purity Alumina production (HPA)
- Halloysite Nanotube Technologies



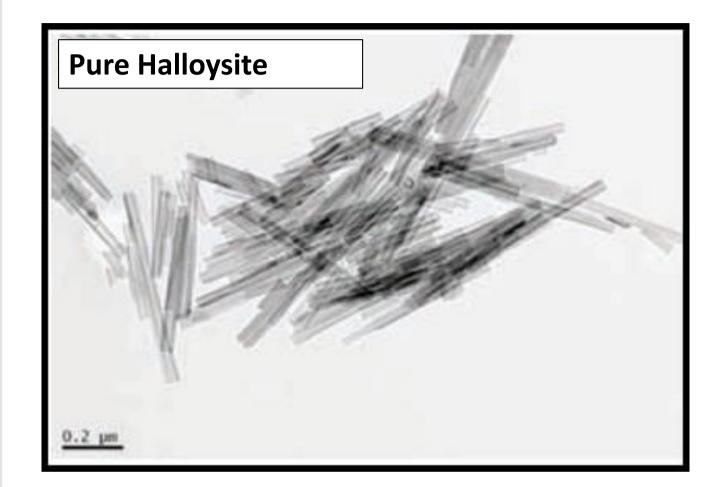


## **Nanotechnology Applications**

The Global Innovative Center for Advanced Nanomaterials (GICAN) industry hub at the University of Newcastle is using Carey's Well pilot plant material in halloysite nanotube technology research

#### **Emerging Applications**

- Micro-containers for delivery of drugs, biocides and pesticides
- Manufacture of carbon nanostructures batteries, superconductors, water purification
- Coatings flame retardants and nucleating agents
- Carbon dioxide capture, storage and conversion to fuel



# **Marketing Strategy**

#### **Opportunities**

- Significant and increasing demand for:
  - Direct Shipping Ore
  - Beneficiated ore
- Market to petrochemical industry catalytic cracking
- Premium HPA feedstock

#### **Technical Approval**

High quality ceramic customers







# **Bulk Sampling & Processing Trials**

#### **Bulk Sampling**

210t bulk sample taken in October 2018

#### **Commercial Processing Trials**

- Full scale dry processing December 2018
- Full scale wet processing Q1 2019
- Full-scale commercial application trials ceramics

#### **Commercial Agreements**

Legally binding agreements following outcomes of processing trials

#### **Analysis of Samples**

 Preliminary XRF testing has shown the bulk sample material to be of truly world class purity



### Mine Plan

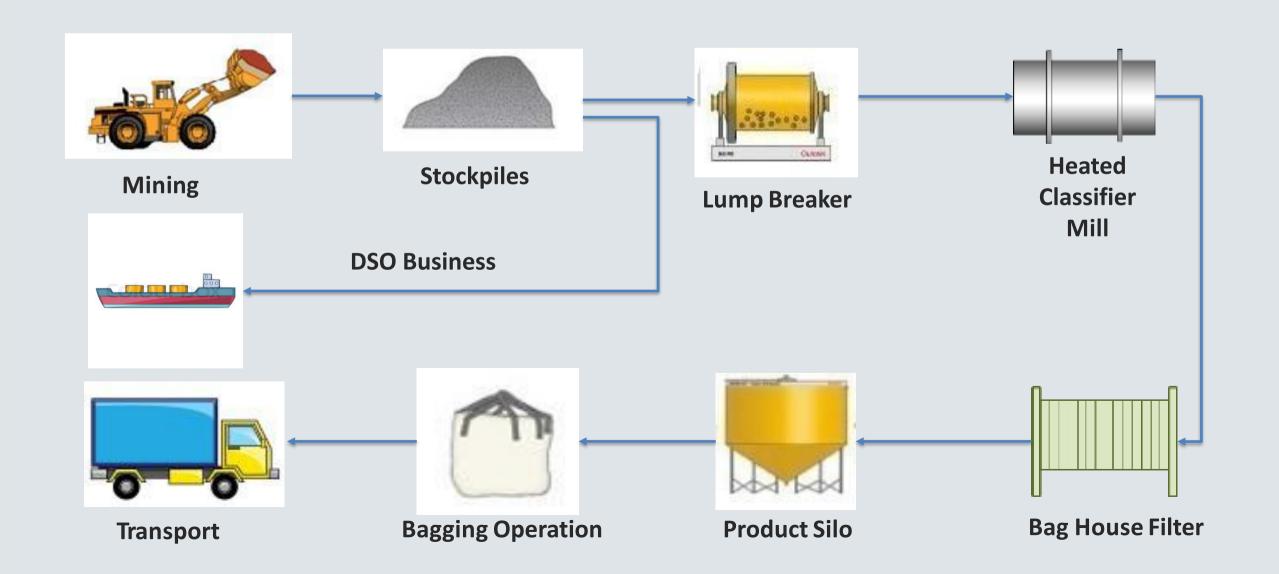
- Open cut quarry
- Low stripping ratio
- Campaign mining using contractors
- Stockpile at site and/or near port facility
- Pit backfill and progressive mine rehabilitation





## **Processing Options**

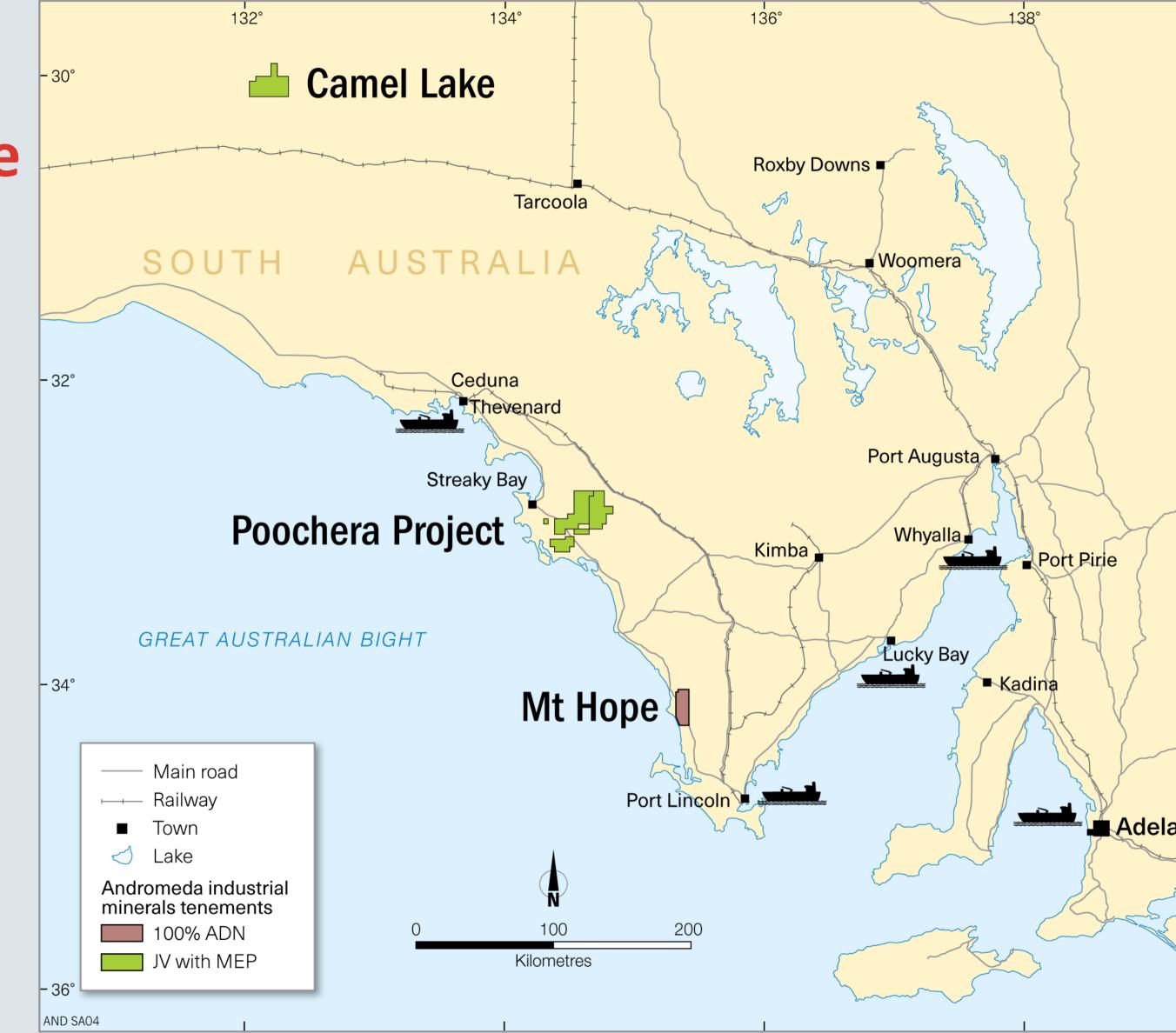
- Commence direct shipping ore business
- Second stage production plan to remove 50% waste (sand)
- Transport cost reduced by half
- Potential to give a market ready product with much higher value
- Contract toll production of fully refined product for export business





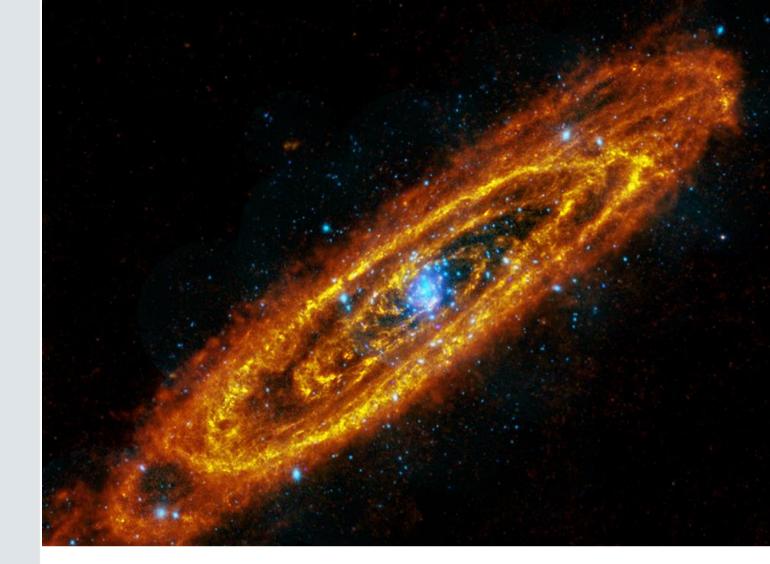
# **Existing Infrastructure**

- Adjacent to Streaky Bay, SA
- Highway access to ports at Ceduna, Lucky Bay and Port Lincoln



### Summary

- South Australia has probably the world's largest resources of halloysite kaolin
- This is a relatively high value industrial mineral
- Global demand is increasing
- Global production has decreased significantly
- Pure halloysite is an even more extreme example of that
- Andromeda is well positioned to become one the world's leading producers of these materials



### **Thank You**