

# Andromeda

## Developing a World-Class Halloysite-Kaolin Project

James Marsh, Managing Director

**AGM Presentation**  
**November 28<sup>th</sup> 2019**

 **Andromeda**  
METALS

ASX:ADN  
[www.andromet.com.au](http://www.andromet.com.au)

# Andromeda Corporate Overview

## Capital Structure (as at 27<sup>th</sup> November 2019)

Cash Reserves of \$4.93M

Zero Debt

Enterprise Value \$76.0M

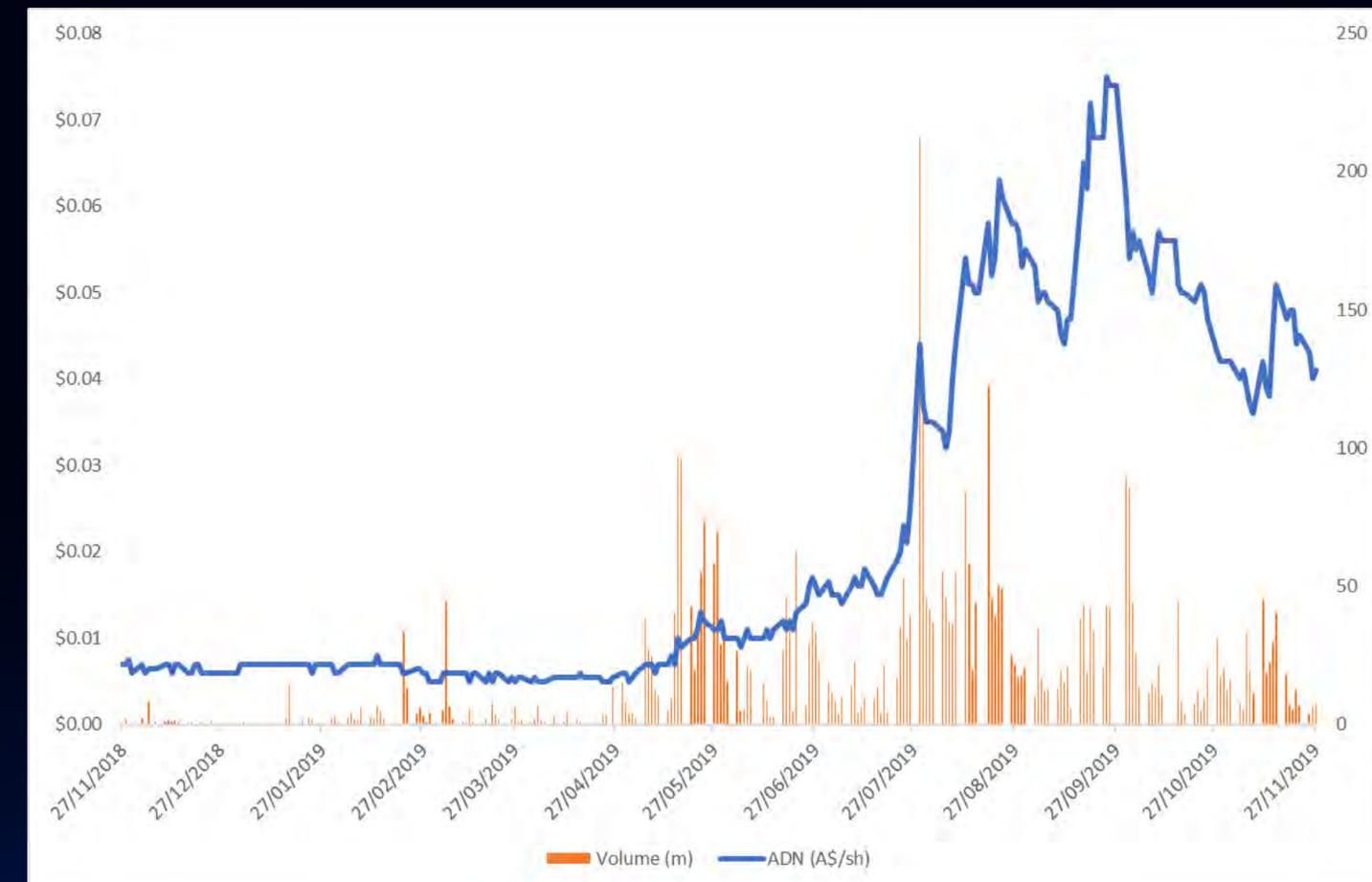
## Shareholder Breakdown

Andromeda Metals has on issue the following securities:

- 1,444,507,511 fully paid ordinary shares
- 700,626,653 list options with an exercise price of \$0.012 and expiry date of 30 Nov 2020
- 20,000,000 unlisted options with an exercise price of \$0.012 and expiry date of 15 Nov 2021

## Top Ten Shareholders

1.	Buratu Pty Ltd (Connolly Super Fund A/c)	8.90%
2.	Debuscey Pty Ltd	2.08%
3.	Peter Andrew Proksa	1.67%
4.	John Pezzaniti	1.36%
5.	BNP Paribas Nominees Pty Ltd (IB Au Noms Retail Client DRP)	1.36%
6.	Sihong Zeng	1.29%
7.	Citicorp Nominees Pty Ltd	1.07%
8.	Janet Monica Henriod	1.04%
9.	Adonis Kiritsopoulos & Jennifer Anne Ford	0.87%
10.	MLB Holdings Pty Ltd (MLB Family A/C)	0.84%



# Company Overview

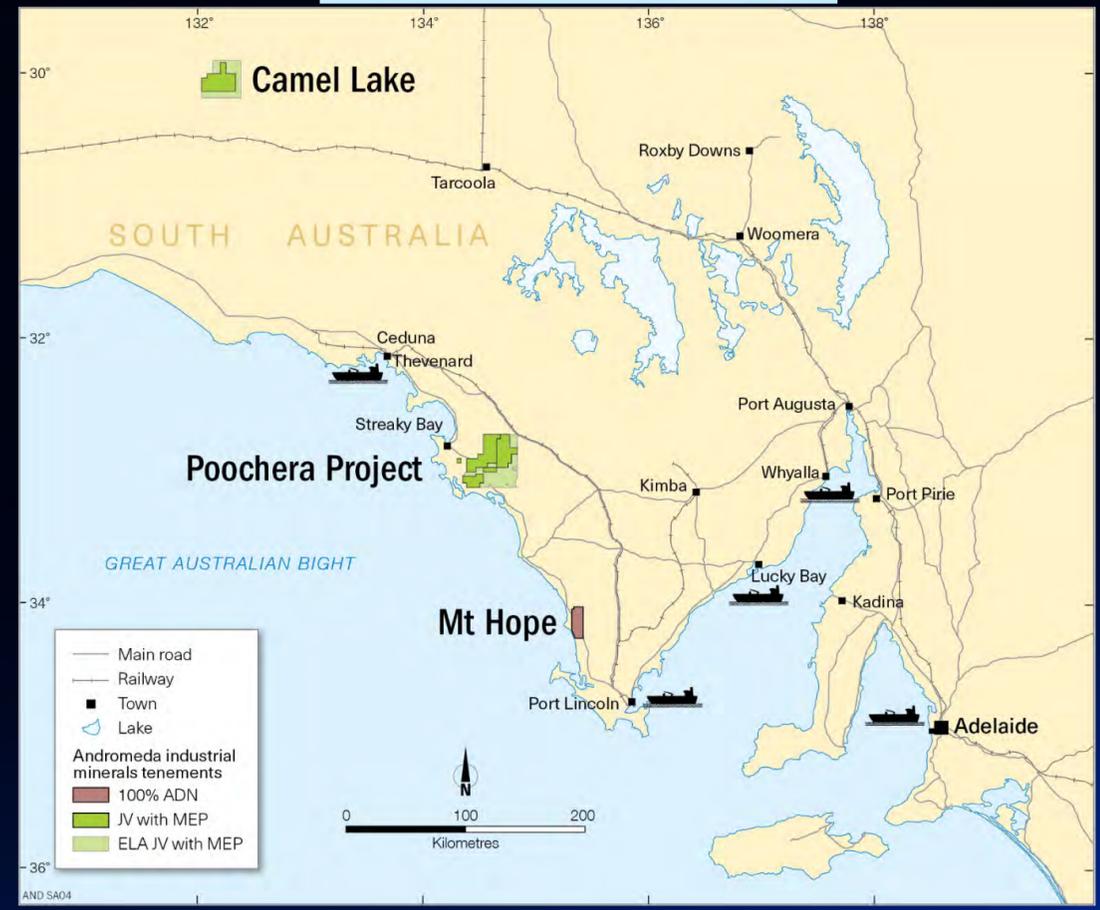
## Our Vision

*To be a world leading producer of halloysite kaolin, and specialist nanotube technology company*

- Exploration and development company with a portfolio of assets in key minerals regions of SA, QLD and WA
- Focused on development of the Poochera core asset in South Australia into a world-class halloysite-kaolin mining operation
- Exploration for high-purity halloysite at Camel Lake and Poochera
- Upgrade of the historic Mount Hope halloysite-kaolin resource
- Highly experienced and focused board

## Additional Assets

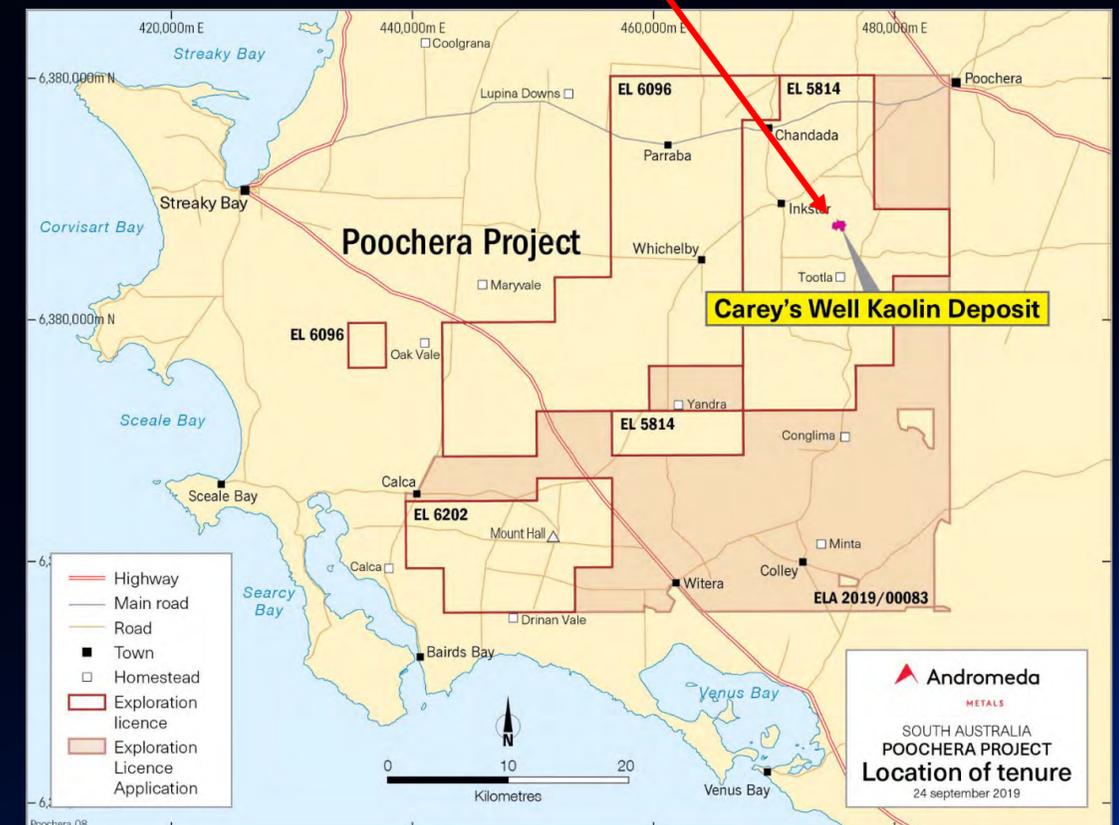
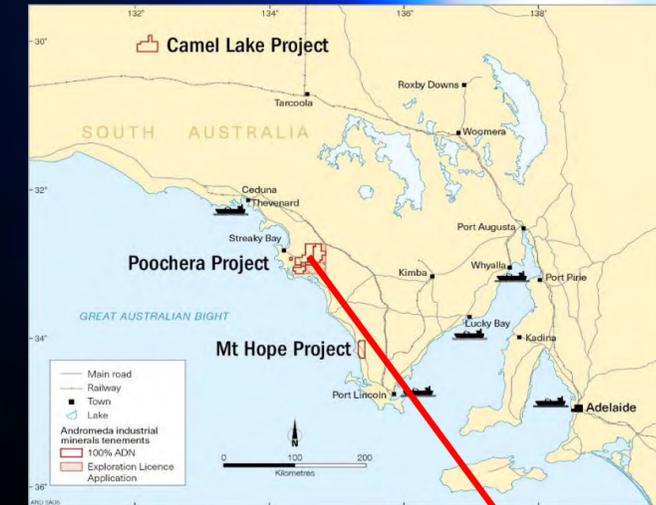
- ★ JV with Evolution Mining - Gold in Qld
- ★ JV with Environmental Copper Recovery - Copper in SA
- ★ JV with Cobra Resources PLC - Gold in SA
- ★ Gold tenements in Pilbara - Opportunities being investigated



# Poochera –World Class Opportunity

## Primary Project Focus - Halloysite-Kaolin Project JV with Minotaur Exploration

- Project hosts one of the world’s largest halloysite-kaolin Resources(1)
- Located close to essential infrastructure
- Very positive Scoping Study reinforces the viability of the Project(2)
- Offtake LOI agreements signed for a total of almost 1 million tpa of products
- High Purity Alumina (HPA) testwork proved a 99.99% (4N) feedstock in a single stage
- Numerous opportunities in existing and emerging Halloysite Nanotube Technology (HNT) applications



(1) – Andromeda ASX announcement Feb 12 2019 – ‘Poochera Halloysite Kaolin Mineral Resource’

(2) – Andromeda ASX announcement Sep 30 2019 – ‘Scoping Study Delivers Robust Economics for Poochera Halloysite-Kaolin Project’

# Defined Resource

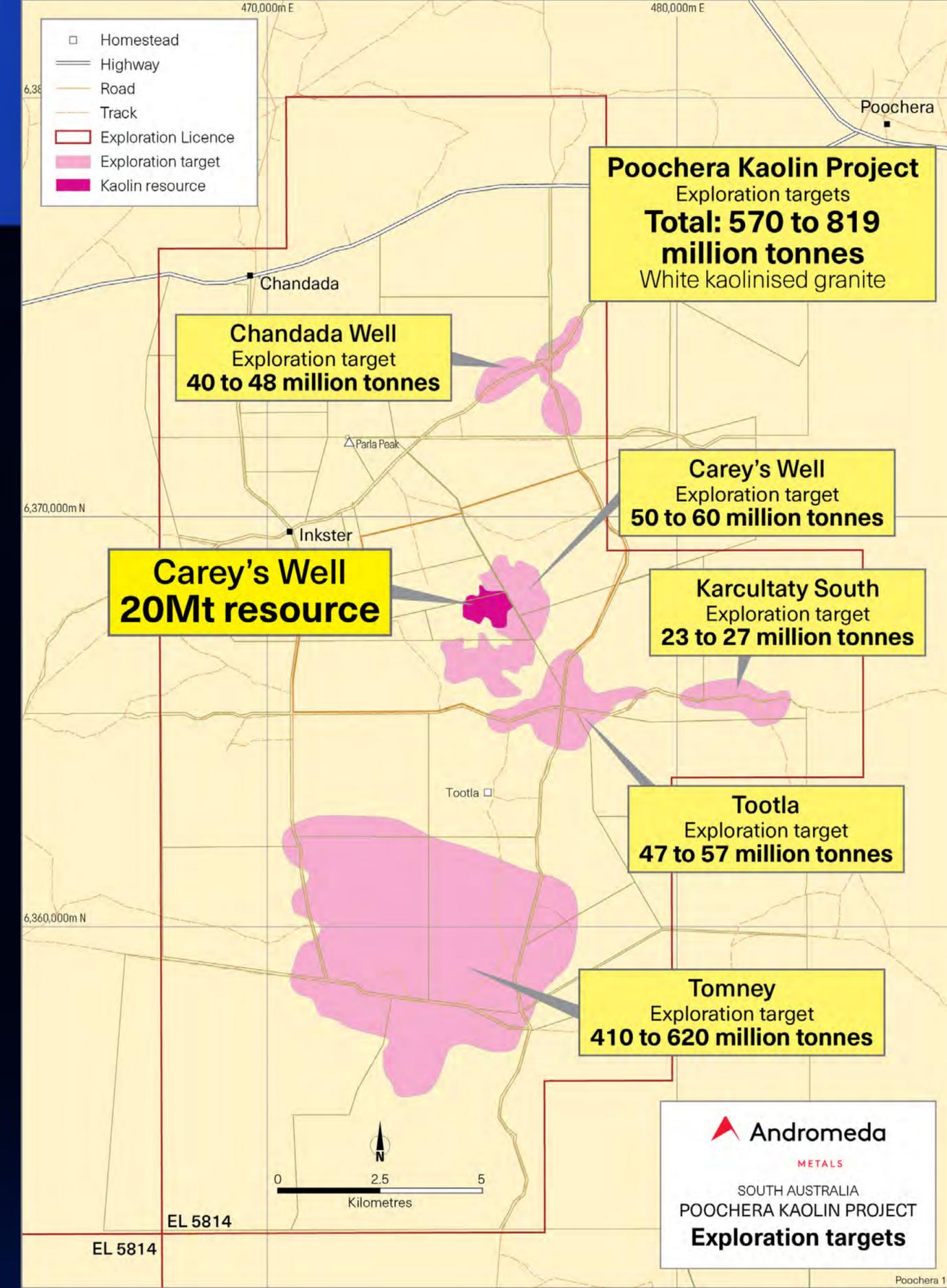
## JORC 2012 Resource Estimate for Carey's Well

- Total 20Mt of “bright white” kaolinised granite
- Halloysite component of 9.7Mt<sup>(1)</sup>

## Exploration

- Drilling campaign recently completed
- Extensive drilling campaign planned for Dec 2019
- Exploration targets indicate 570 – 810 million tonnes<sup>(2)</sup>

(1) - Andromeda Metals ASX announcement 12 Feb 2019 – ‘Poochera Project Halloysite Kaolin Mineral Resource’  
 (2) - Minotaur Exploration ASX announcement 3 May 2012 – ‘Major Exploration Target Established for Poochera Kaolin Project South Australia’

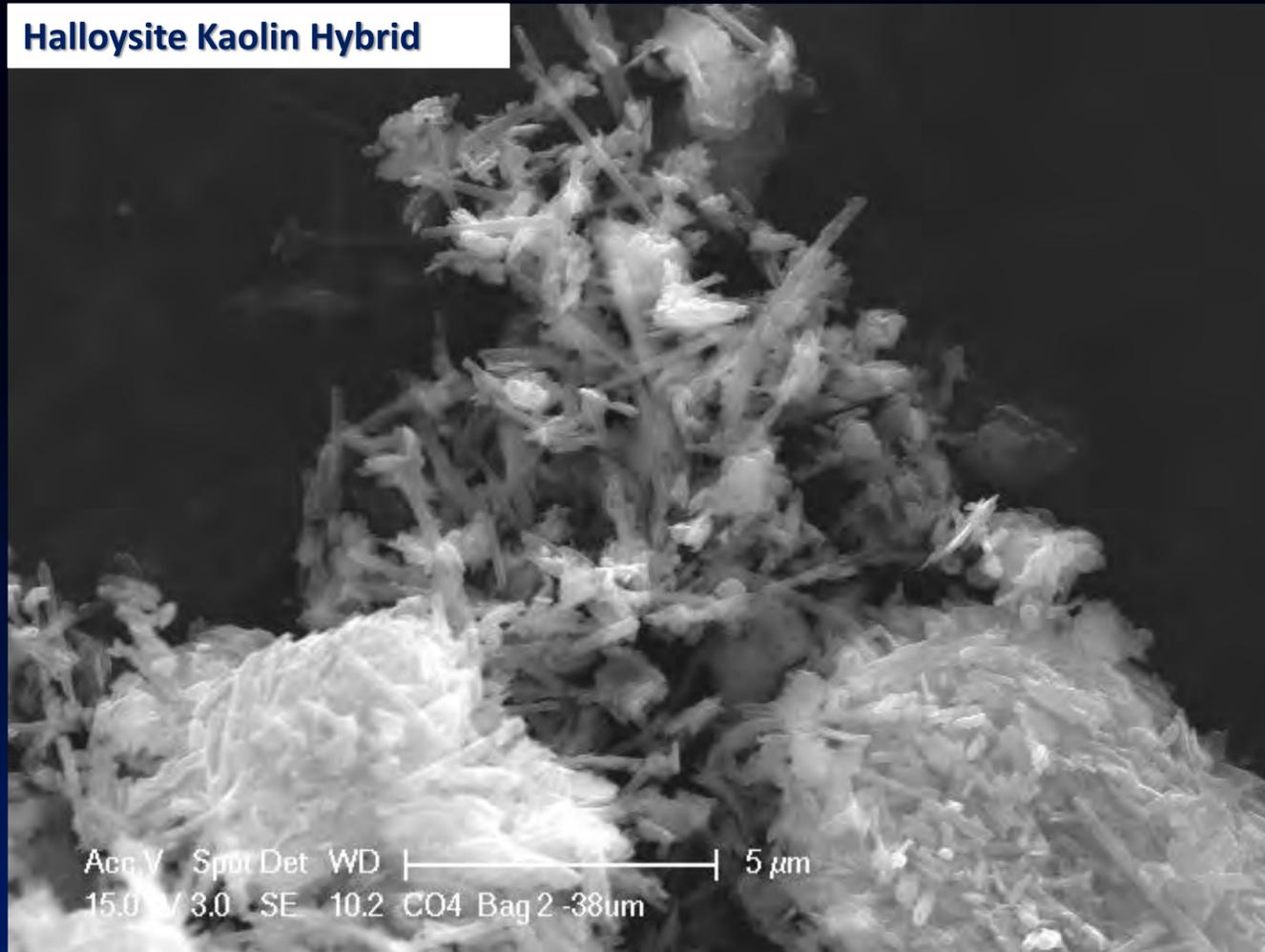


# What is Halloysite-Kaolin?

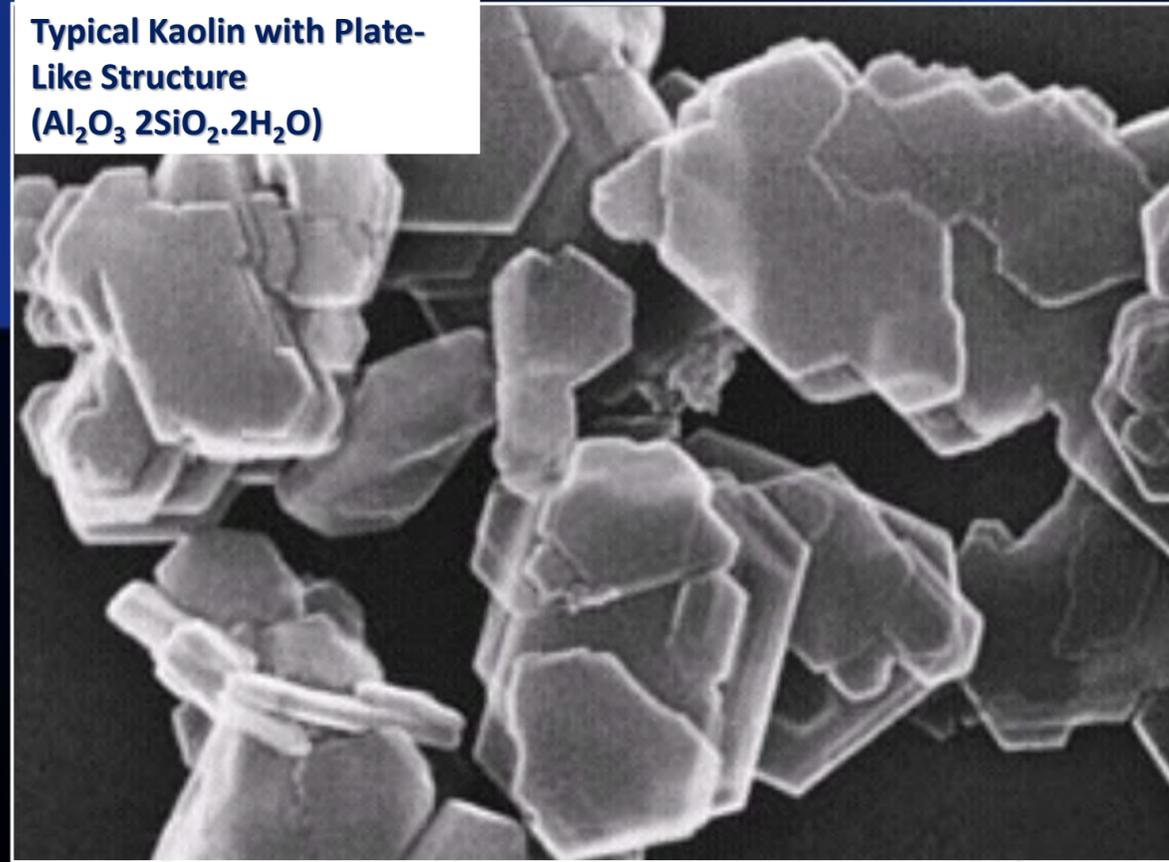
- Halloysite is a rare 'tubular shaped' derivative of kaolin

The Poochera resource is a naturally occurring hybrid blend of halloysite and kaolin

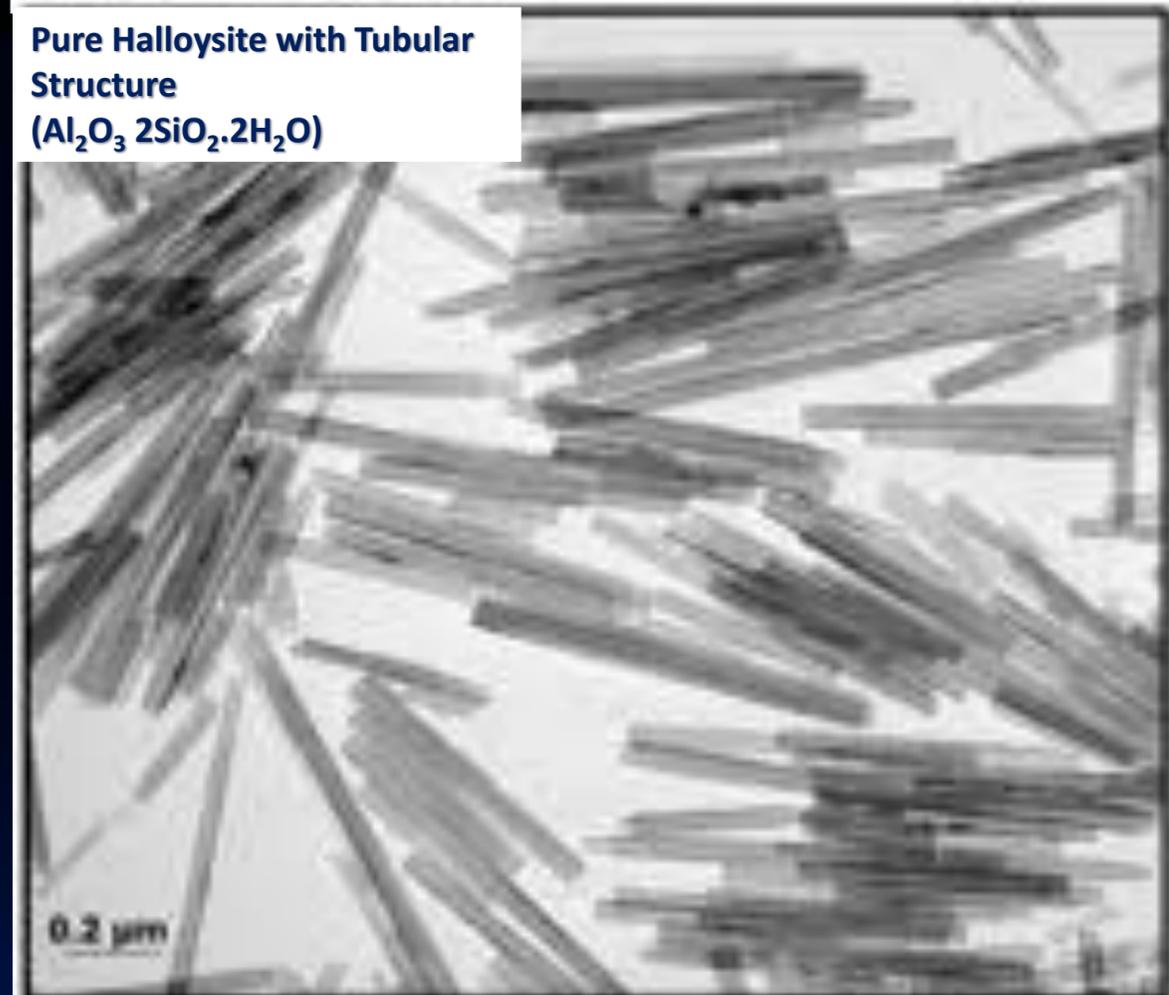
**Halloysite Kaolin Hybrid**



**Typical Kaolin with Plate-Like Structure**  
( $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ )



**Pure Halloysite with Tubular Structure**  
( $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ )



# Where is Halloysite-Kaolin Used?



## Mature Established Markets

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

## New and Emerging Markets

- High Purity Alumina production (HPA) - New
- Halloysite Nanotube Technologies – Existing and Emerging

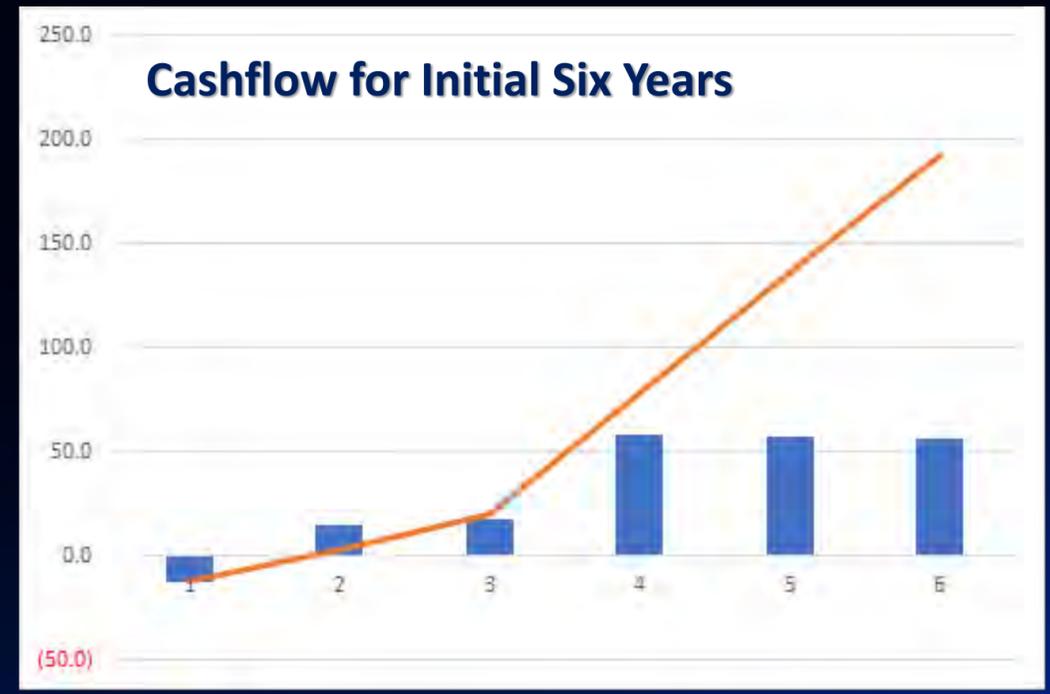
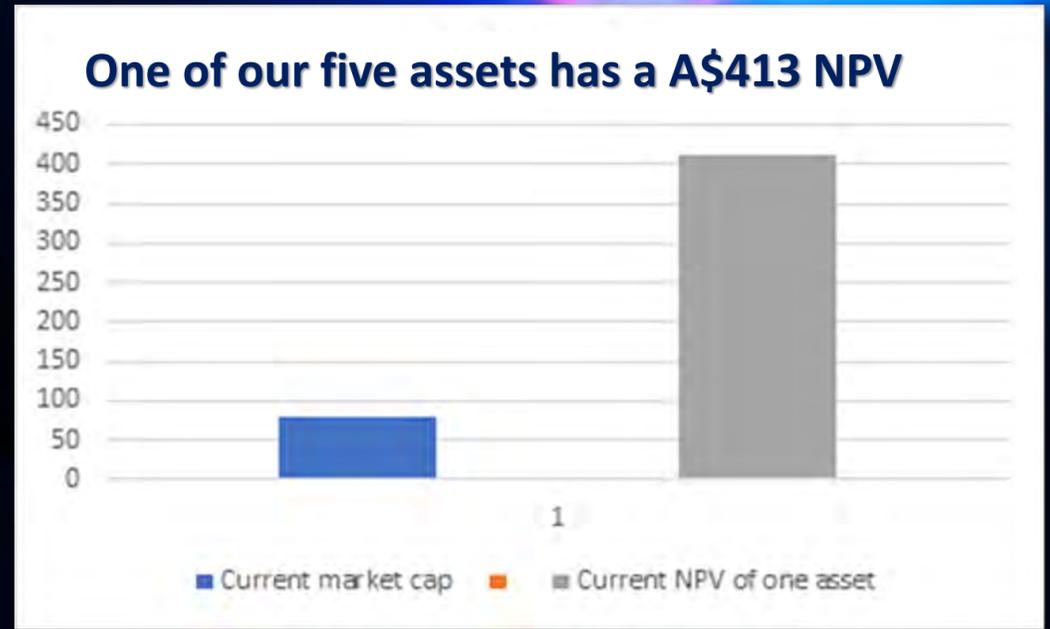
## Indicative Relative Commercial Values

- DSO (50% sand) - AU\$115 – AU\$140/t
- Refined Kaolin/Halloysite Hybrid - AU\$350 - AU\$1,000/t
- Pure Halloysite - AU\$5,000/t
- HPA 4N(99.99%) – AU\$35,000/t Upwards
- Halloysite Nanotechnology



# Scoping Study Highlights

- Initial mine life of 15 years at 500ktpa
- Early shallow open-cut mining to ship DSO for toll wet-refining in China
- Dry-processing on site during the second year of operation to give a 'Concentrate'
- LOM projected cashflow A\$800M
- LOM Revenue A\$1,953M
- Net Present Value of A\$413M at a discount rate of 8%
- Internal Rate of Return of 174%
- All in Sustaining Cost (AISC) averages A\$396/t, with an anticipated selling price of A\$700/t
- Pre-production capital cost A\$9M
- Maximum cash requirement of A\$25M prior to DSO operation/revenues received
- Breakeven payback 15 months from the start of site works
- Construction of the dry-processing plant (projected cost of A\$28M) to be funded from cashflow



# The Path Forward

- Scoping Study Released – Sep 2019
- Halloysite Purification Testing – Dec 2019
- Resource Upgrade – Dec 2019
- Exploration Access Camel Lake – Dec 2019
- Poochera Drilling Program – Dec 2019
- Environmental and Feasibility Studies - to mid 2020
- Land Access Agreement – early 2020
- Mining Lease Approvals – through 2020
- Upgrade Mount Hope Resource – 2020
- Camel Lake Exploration – early-mid 2020
- High Purity Halloysite Resource – late 2020
- Potential Commencement of Operations – target mid 2021



# Operational Strategy

## Opportunities

### Short Term – early cash flow

- Direct Shipping Ore to Toll Wet-Refining
- Wet Refining Toll Process (China/Japan) – premium product

### Medium Term – 18 months from start of operations

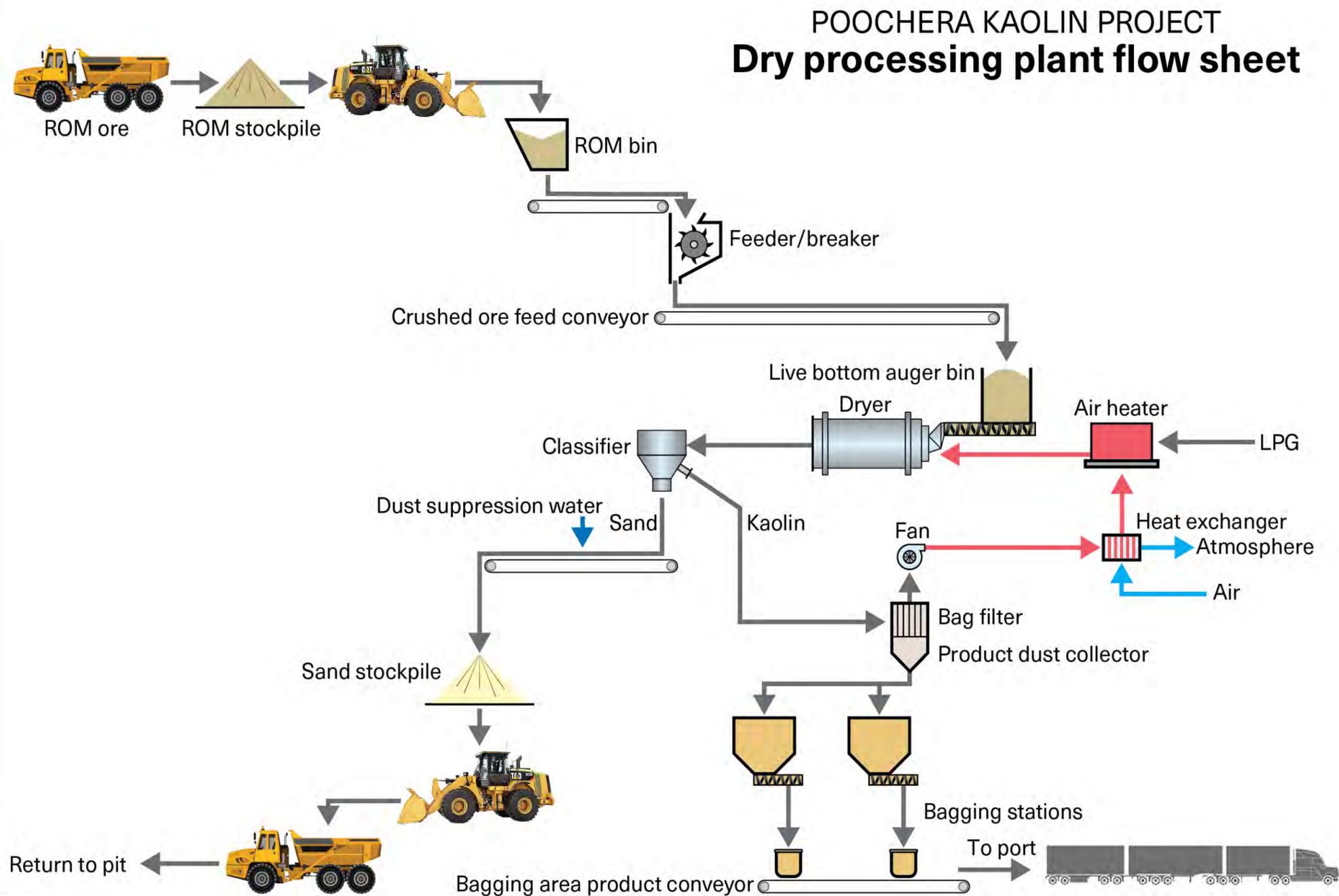
- Dry or Wet Process at Mine Site – 50 to 60% waste reduction
- Halloysite Purification

### Long Term

- Premium HPA feedstock – partnership opportunities
- Nanotechnology – research partnerships



# Dry-Processing Option



- Dry-processing to remove 50% waste (sand) and about 10% moisture
- Transport cost reduced by about 60%
- Potential to give market ready products (Offtakes signed for dry-processed )



# Marketing Strategy

## Short Term – Halloysite-Kaolin

- Convert Offtake LOI's to Binding Agreements
- Target Additional Regions – Asia/Europe/Middle East
- Target Additional Sectors – Catalysts/Remediation/Calcined

## Medium Term

- Offtake LOI's for High-Purity Halloysite
- Industrial Partnership

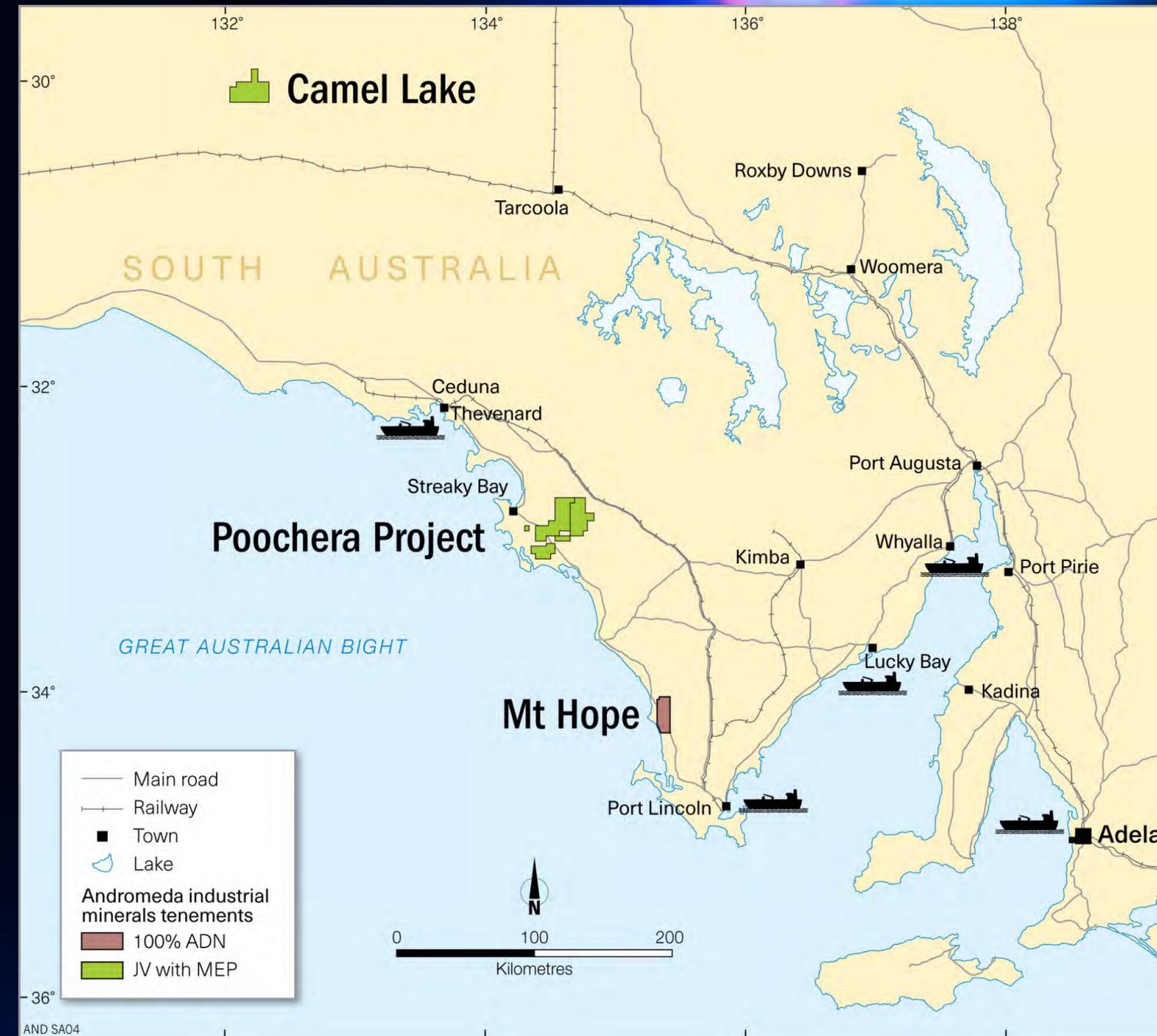
## Long Term

- Nanotechnology – Commercialisation
- HPA - Commercialisation



# Existing Infrastructure

- Adjacent to Streaky Bay, SA
- Local potential workforce
- Ports at Lucky Bay, Ceduna, Port Lincoln and Whyalla have capacity and offer suitable shipping options
- Ceduna currently shipping industrial minerals in bulk

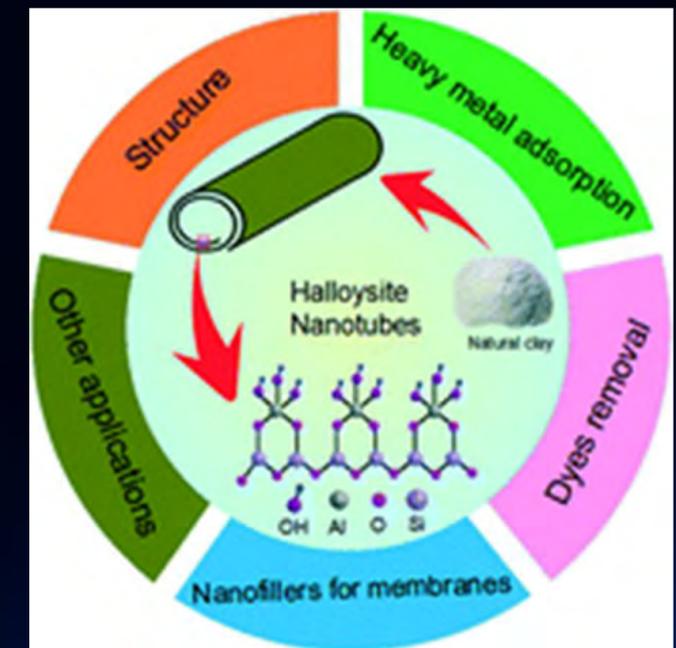


# High Purity Halloysite a Potential Game Changer

- Over 7,000 current research papers
- 70 new patents granted last year alone
- No significant commercial supply globally
- ADN has high-purity halloysite – resources to be determined

## Emerging Applications:

- Hydrogen Storage and Transport
- Batteries and Super-Capacitors
- Water Purification
- Carbon Dioxide Capture - Storage and Conversion to Fuel
- Medical Delivery of Drugs
- Construction – Delivery of Biocides
- Agriculture – Delivery of Pesticides and Fertilisers
- Polymers and Coatings – reinforcement and fire-retardancy



# Halloysite Exploration Plans

## Extensive drilling campaign carried out at Poochera in Apr/May 2019

- Resource upgrade results imminent
- High purity halloysite regions confirmed

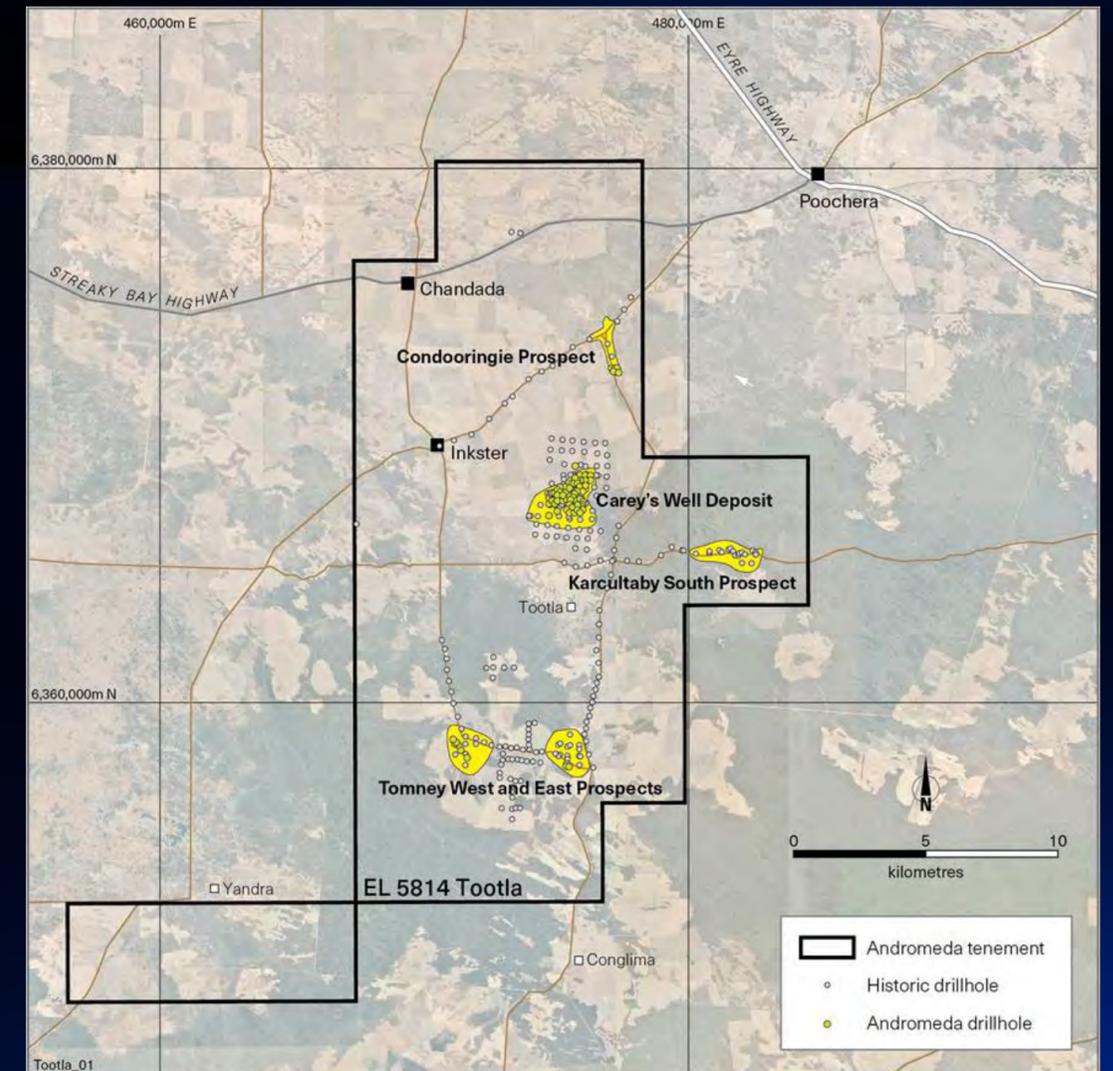
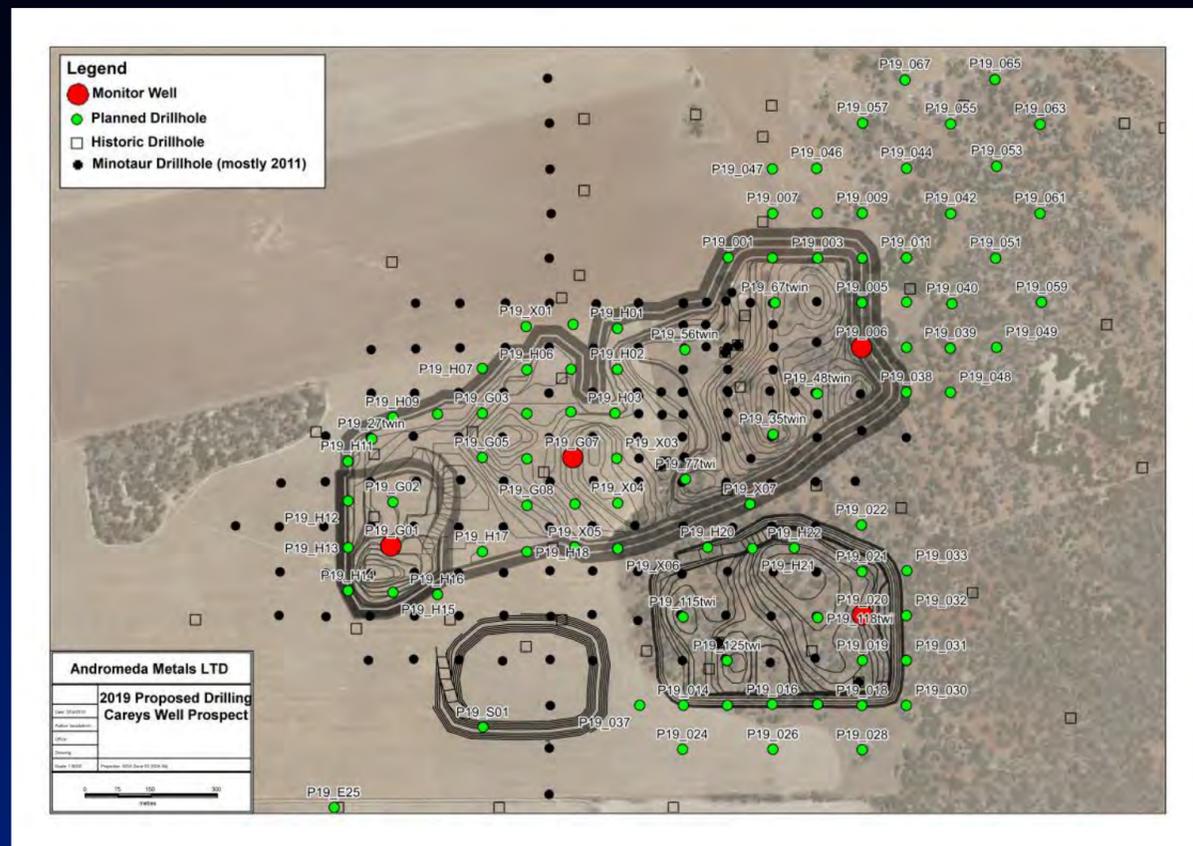
## What's next

- Poochera – Further resource extension, high-purity halloysite areas and geotechnical drilling
- Camel Lake - Ultra high-purity halloysite
- Mount Hope - Upgrade of historic non-JORC 12.2Mt halloysite-kaolin resource

# Poochera Drilling Apr/May 2019

- April/May 2019 drilling program totaled 109 holes for 3,265 metres

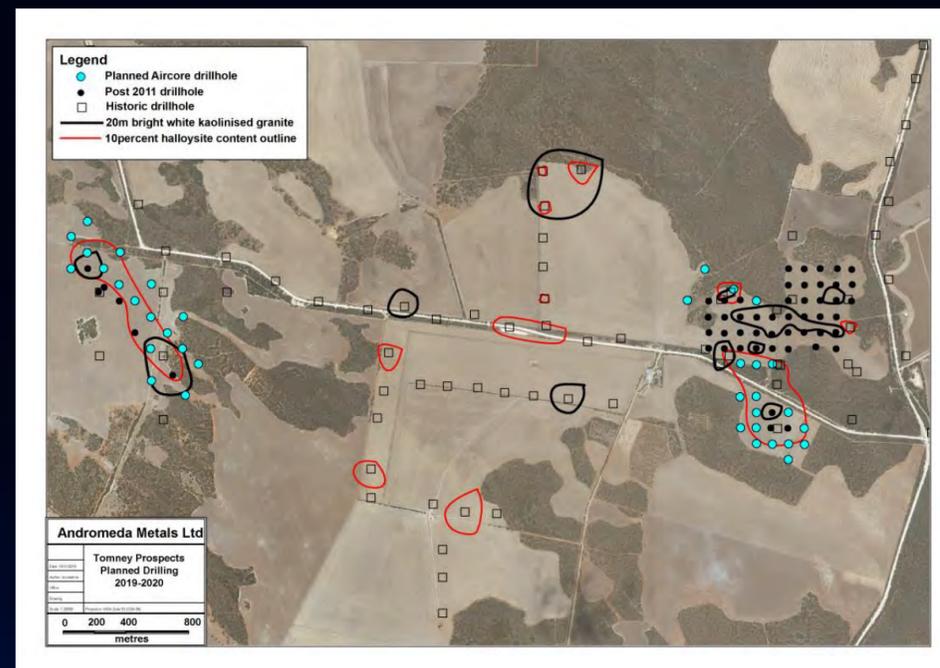
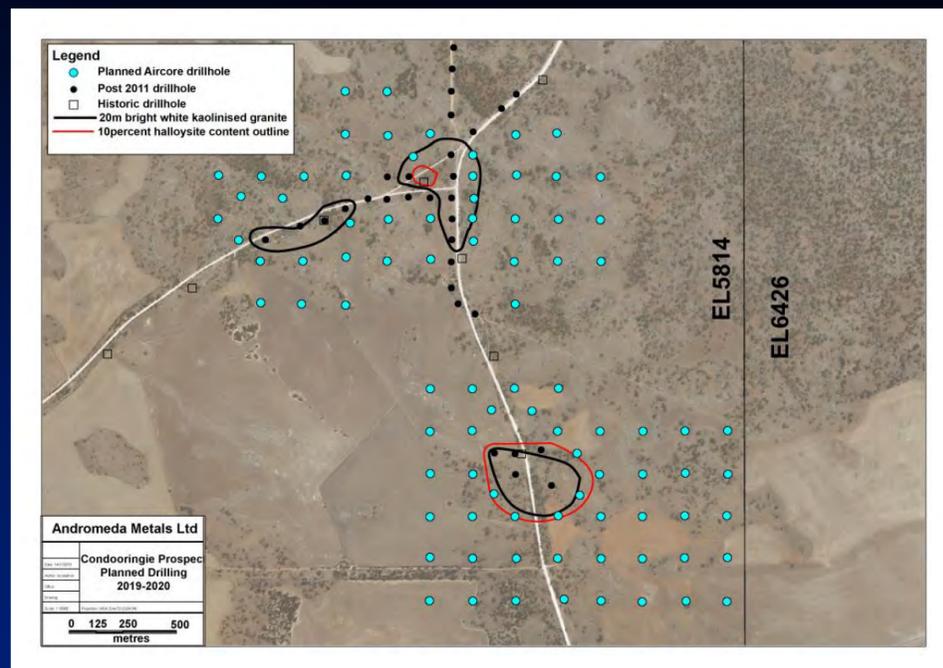
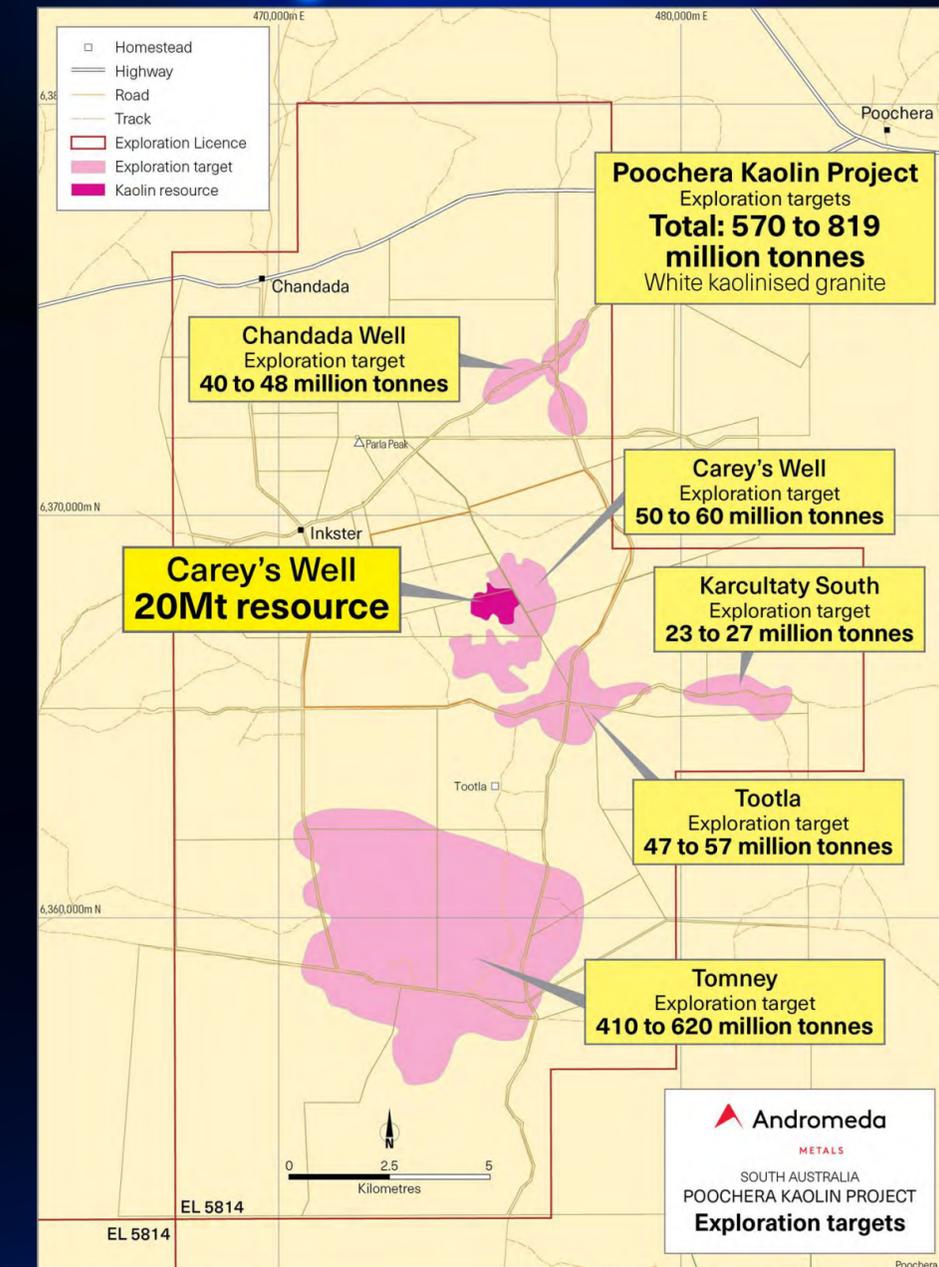
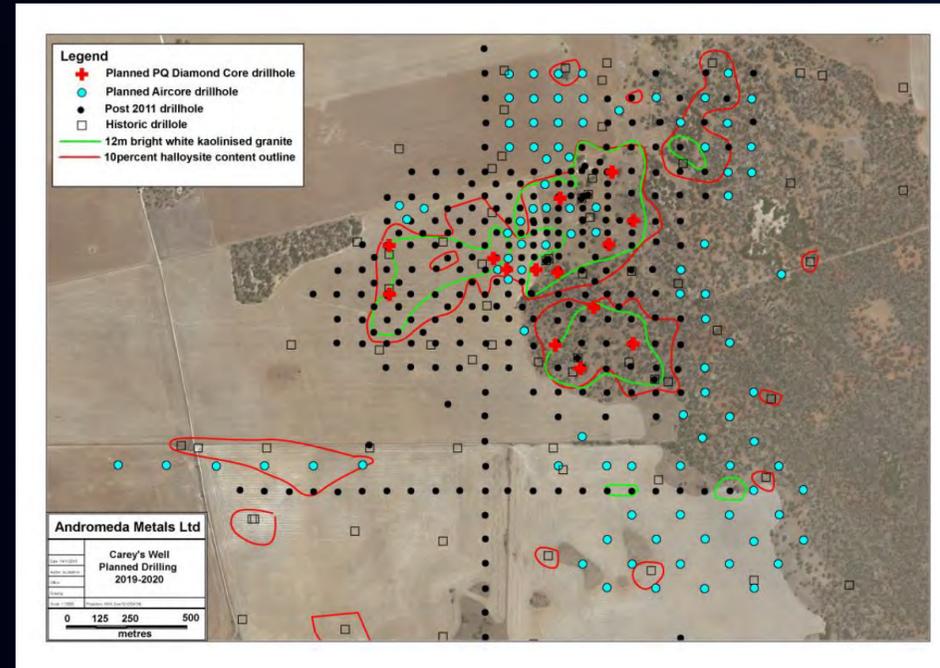
Prospect/Deposit	Location	Drillholes Completed	Total Metres
Carey's Well	20kms southwest of Poochera	95	2,736m
Condooringie	4kms north of Carey's Well Deposit	5	234m
Tomney East	10kms south of Carey's Well Deposit	3	152m
Tomney West	10kms south-southwest of Carey's Well Deposit	6	143m
<b>Total</b>		<b>109</b>	<b>3,265m</b>



# Poochera Exploration

- Further extension to Carey's Well resource
- Sterilisation drilling at Carey's Well
- Mine planning drilling at Carey's Well
- Condooringie Well drilling – high purity halloysite targets

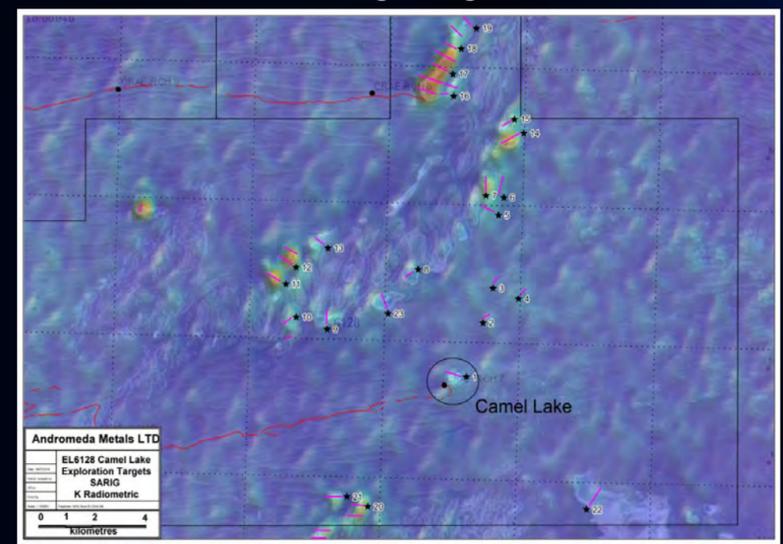
Poochera Project Exploration targets indicate 570 - 810 million tonnes



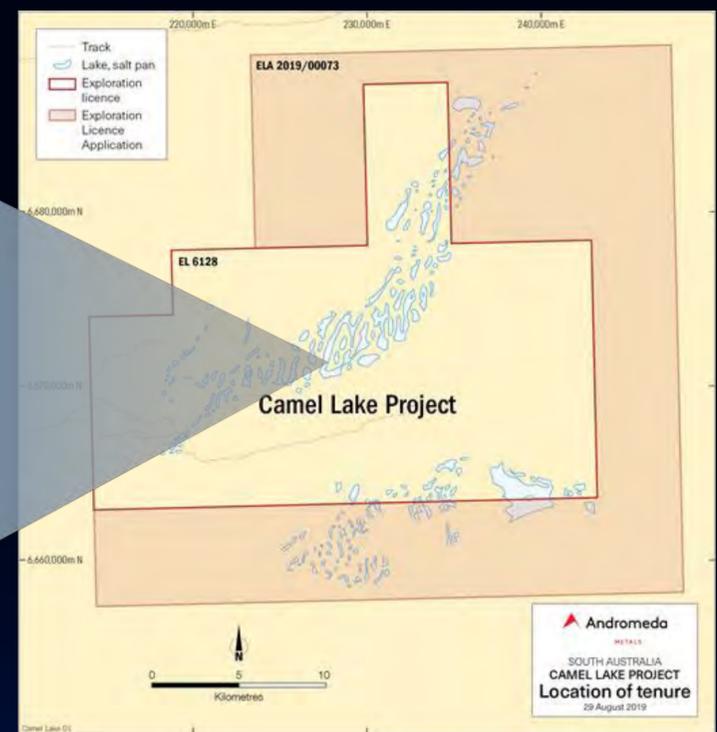
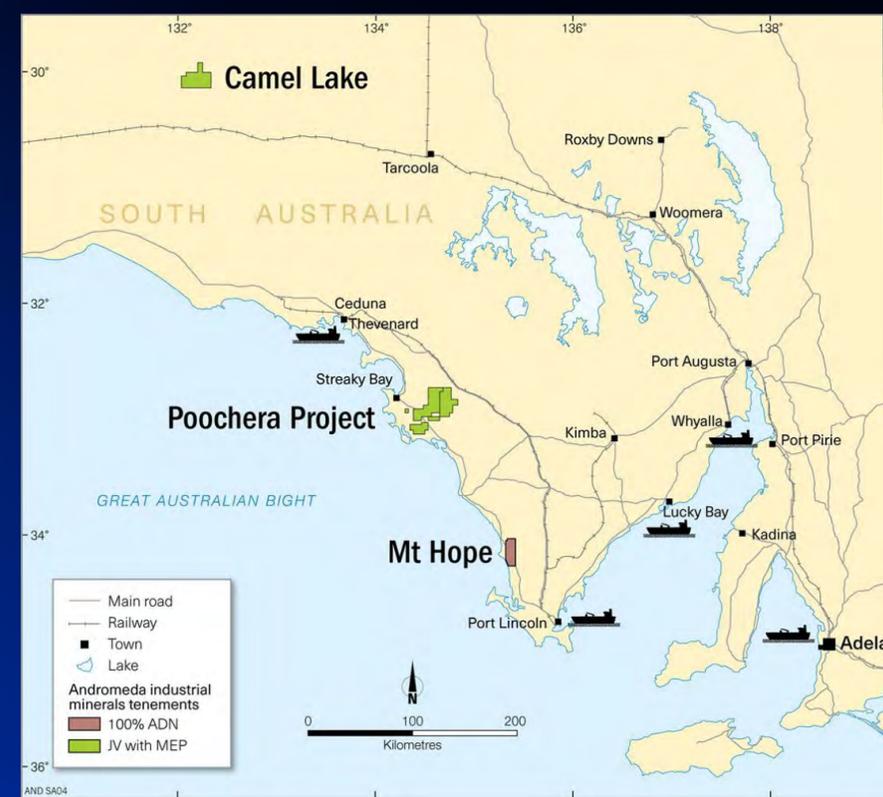
# Camel Lake Exploration

- Halloysite found at 99.6% purity just below surface
- Samples show extremely high shape consistency
- Samples show ideal shape for new nano-technology

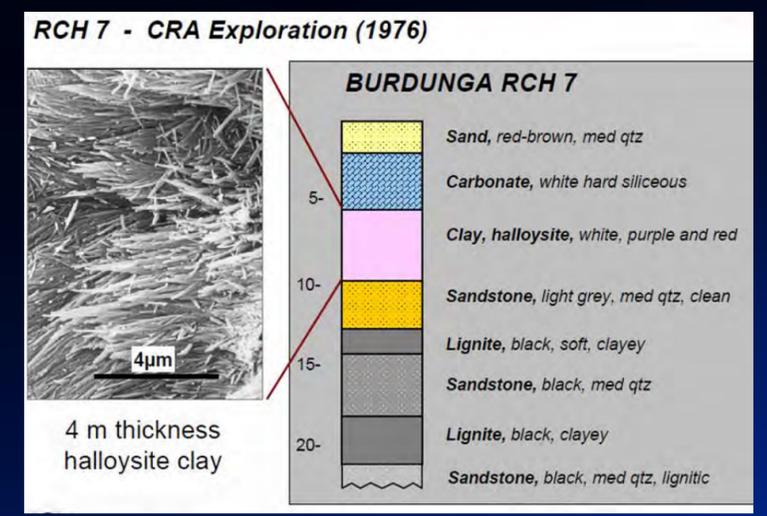
Potential Drilling Targets



High Purity Halloysite Just Below Surface

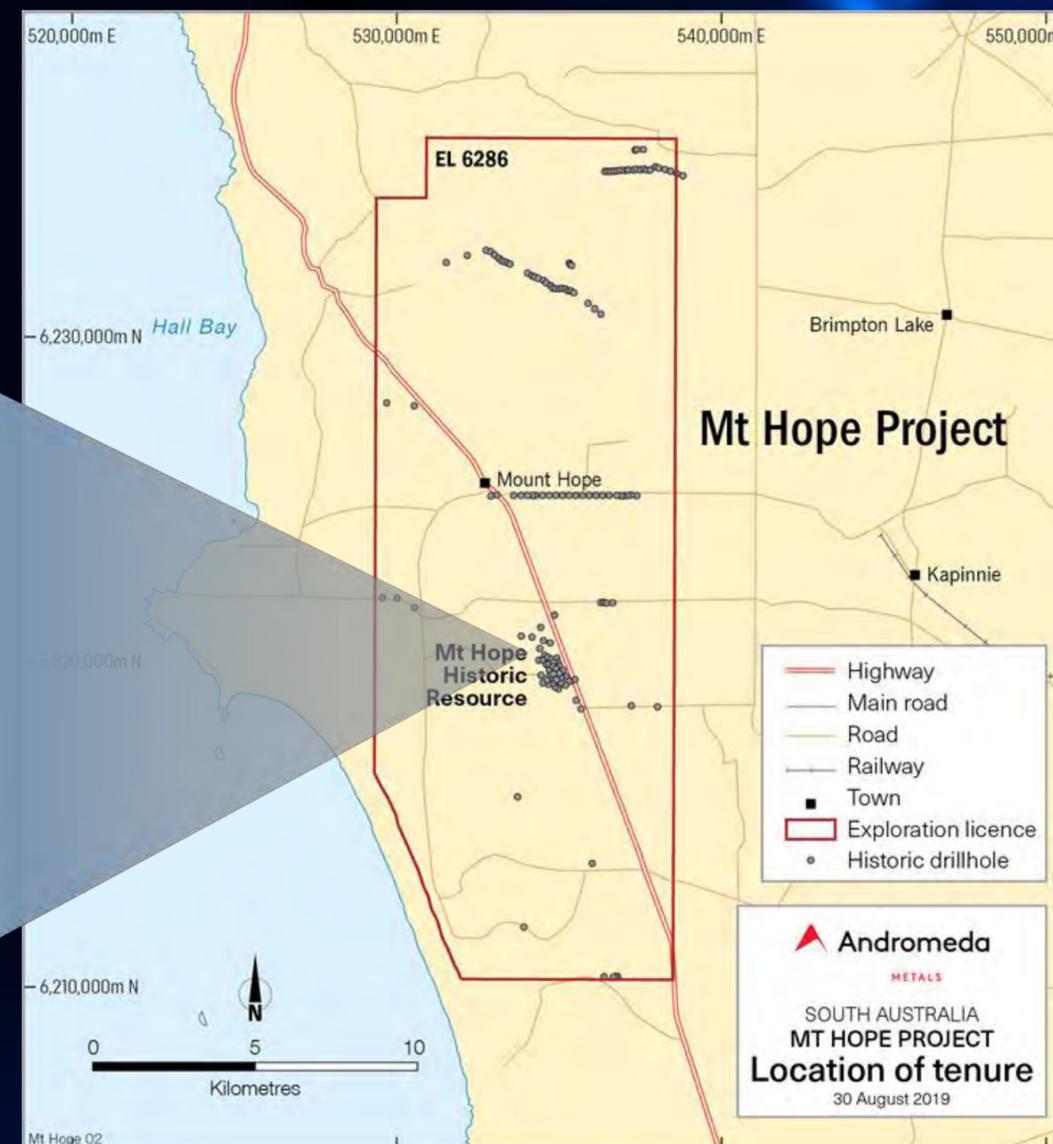
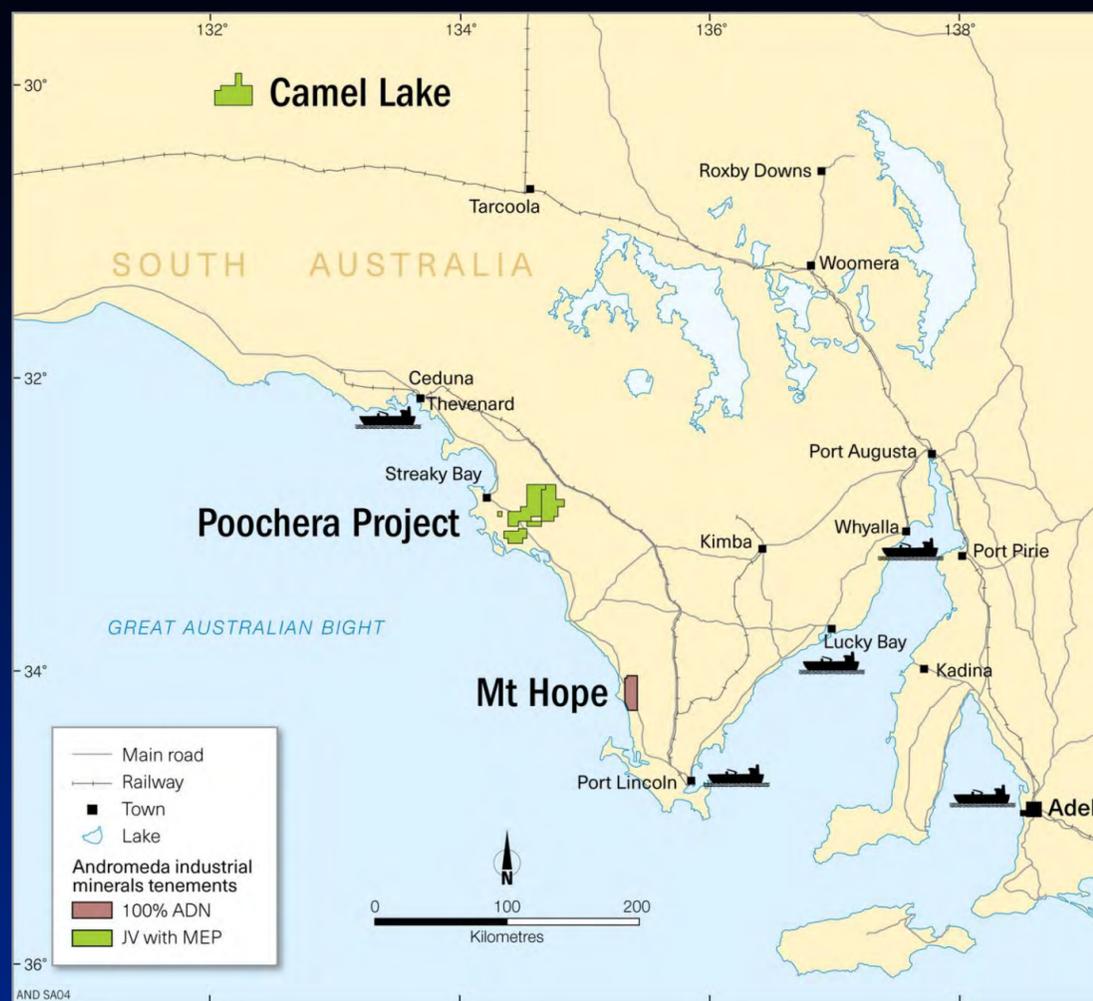


Extremely Consistent Size and Shape



# Mount Hope Exploration

- 100% owned
- Historical non JORC Resource of 12.26Mt
- Nine historic mining leases granted
- Sample pit dug
- Only 80km from Port Lincoln



# In Summary

- South Australia has one of the world's largest resources of halloysite-kaolin
- This is a relatively high value industrial mineral
- Global demand is increasing\* and production is decreasing
- Right product, at the right time, in the right place
- Andromeda is well positioned to become the world's leading producer of this mineral
- Huge blue-sky potential in HPA and nano-technology

## Thank You

*James Marsh  
Managing Director  
james.marsh@andromet.com.au*

### **Cautionary Statements**

The Scoping Study referred to in this announcement has been undertaken to determine the potential viability of a direct shipping and dry-processing operation to produce high-quality halloysite-kaolin product at Poochera in South Australia that will provide Andromeda Metals with the confidence to undertake further and more detailed feasibility studies for the project. It is a preliminary technical and economic study of the potential viability of the Poochera Halloysite-Kaolin Project. It is based on low level technical and economic assessments that are not sufficient to support the estimation of ore reserves. Further exploration and evaluation work and appropriate studies are required before Andromeda Metals will be in a position to estimate any ore reserves or to provide any assurance of an economic development case.

The Production Target referred to in this announcement is based on Measured and Indicated Resources for the mine life. Andromeda Metals has concluded that it has reasonable grounds for disclosing a Production Target, however there is no certainty that the Production Target or preliminary economic assessment will be realised. The Scoping Study is based on the material assumptions outlined elsewhere in this announcement. These include assumptions about the availability of funding. While Andromeda Metals considers all of the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the Scoping Study will be achieved.

To achieve the range of outcomes indicated in the Scoping Study, funding in the order of AUD 13 million, inclusive of working capital, will likely be required. Investors should note that there is no certainty that Andromeda Metals will be able to raise that amount of funding when needed. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of Andromeda Metals' existing shares. It is also possible that Andromeda Metals could pursue other 'value realisation' strategies to provide alternative funding options. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Scoping Study. These materials include forward looking statements. For further information on forward looking statements please refer to the end of this release.

### **Forward Looking Statements**

Some of the statements contained in this report are forward looking statements. Forward looking statements, include, but are not limited to, statements concerning estimates of tonnages, expected costs, statements relating to the continued advancement of Andromeda's projects and other statements that are not historical facts. When used in this report, and on other published information of Andromeda, the words such as 'aim', 'could', 'estimate', 'expect', 'intend', 'may', 'potential', 'should' and similar expressions are forward looking statements. Although Andromeda believes that its expectations reflected in the forward-looking statements are reasonable, such statements involve risks and uncertainties and no assurance can be given that actual results will be consistent with these forward-looking statements. Various factors could cause actual results to differ from these forward looking statements include the potential that Andromeda's project may experience technical, geological, metallurgical and mechanical problems, changes in market prices and other risks not anticipated by Andromeda. Andromeda is pleased to report this summary of the Study in a fair and balanced way and believes that it has a reasonable basis for making the forward-looking statements in this announcement, including with respect to any mining of mineralised material, modifying factors, production targets and operating cost estimates.

This announcement has been compiled by Andromeda from the information provided by the various contributors to the Study. All financial assumptions and estimates are quoted in Australian Dollars ('A\$' or 'AUD') only, unless indicated otherwise.