

Andromeda Metals Limited ABN: 75 061 503 375

#### Corporate details:

ASX Code: ADN

Cash (31 Mar 2020): \$3.36 million Issued Capital:

1,500,463,442 ordinary shares 645,073,298 ADNOB options 99,000,000 unlisted options

#### Directors:

#### **Rhod Grivas**

Non-Executive Chairman

#### James Marsh

Managing Director

#### **Nick Harding**

Executive Director and Company Secretary

#### **Andrew Shearer**

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METALS

# **ASX Announcement**

1 June 2020

# Pre-Feasibility Study Further Improves Poochera Halloysite-Kaolin Project Economics

# **Pre-Feasibility Highlights**

- A Pre-Feasibility Study (PFS) prepared for the Poochera Halloysite-Kaolin Project, South Australia has delivered further substantial improvement in the project economics through the inclusion of onsite wet-processing for the production of premium grade refined kaolin clay to meet the large and growing global supply shortfall of high value bright-white halloysite-kaolin for ceramic applications.
- An expanded Life of Mine (LOM) of 26 years based on the updated
   December 2019 Mineral Resource<sup>5</sup> enhances Project cashflows.
- LOM key financial metrics<sup>1</sup> for the PFS comprise the following:
  - All In Sustaining Cost<sup>2</sup> (AISC) averages A\$354/tonne of refined premium halloysite-kaolin product with an anticipated selling price<sup>3</sup> of A\$700/tonne;
  - Project cashflow of A\$1.97B pre-tax and A\$1.39B after-tax;
  - A 35% increase from the previous Scoping Study in pre-tax NPV<sub>8%</sub> to A\$736M and unchanged IRR of 175%;
  - After-tax NPV<sub>8%</sub> of A\$511M and IRR of 135%;
  - Pre-production capital estimated at A\$13M with a maximum cash requirement of A\$28M prior to initial revenues being received;
  - Payback period of 15 months from commencement of mining, through Direct Shipping Ore (DSO) mining, shipping and tollrefining activities;
  - Onsite wet-processing plant and infrastructure, fully funded by revenues received from DSO production, to be constructed in the second year of operation at a cost of A\$56M.
- Production Target<sup>4</sup> is based on shallow open-cut mining of kaolinised granite at 500ktpa which after processing and refining yields a LOM 5.9Mt of 15% halloysite premium product.
- Both initial bulk DSO material and subsequent site processed product will be shipped through existing, or under development, port facilities.
- Estimated workforce of 30-40 people sourced mainly from local region.
- Marketing efforts expanded throughout Asia and Europe, with testing for a range of applications underway with potential customers and distributors.
- Commercial trial quantities of products currently being produced in China and Japan for progressing customer offtake agreements.

Focus now directed towards environmental impact assessments and Mining Lease application as part
of the Definitive Feasibility Study (DFS) with commencement of site activity targeted for early 2022.

# **Cautionary Statement**

The preliminary feasibility study (Pre-Feasibility Study, PFS) referred to in this announcement has been undertaken to study a range of options to produce high-quality halloysite-kaolin product from the Kaolin Resource at Poochera in South Australia in order to provide Andromeda Metals with a basis for a more detailed Definitive Feasibility Study (DFS) for the Project. It is a technical and economic study to identify preferred mining, processing and infrastructure requirements but it has not finalised these. The PFS work has advanced assessments of environmental and socio-economic impacts and requirements but these are also not complete. The estimation of ore reserves is yet to be done.

The Production Target referred to in this announcement is based on this PFS and supported mainly by Measured and Indicated Resources and only minor Inferred Resources. Andromeda Metals has concluded that it has reasonable grounds for disclosing a Production Target, however there is no certainty that the Production Target or the economic assessment will be realised.

The PFS 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 PFS will be achieved.

To achieve the range of outcomes indicated in the PFS, funding in the order of A\$28M, inclusive of working capital, is likely to 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 PFS.

This announcement includes forward looking statements. For further information on forward looking statements please refer to the end of this release.

# **Executive Summary**

Andromeda Metals Limited (ASX: ADN, Andromeda, the Company) is pleased to announce the results of a Pre-Feasibility Study (PFS) for a proposed kaolinised granite open-cut mine and site wet-processing facility at the Carey's Well deposit located on the Poochera Halloysite-Kaolin Project on the Eyre Peninsula of South Australia.

The PFS builds on the highly positive Updated Scoping Study (USS) released in April 2020 (refer ADN ASX announcement dated 6 April 2020 titled "Wet-Processing delivers improved economics for Poochera Halloysite-Kaolin Project") and reinforces the potential for the Poochera Halloysite-Kaolin Project to be a long-term supplier of high-quality halloysite-kaolin product able to meet a growing global demand from ceramics industry manufacturers and hence provide significant cash flows for Andromeda and its joint venture partner Minotaur Exploration Limited (ASX: MEP, Minotaur).

The PFS is based upon an initial phase of mining kaolinised granite as Direct Shipping Ore (DSO) and toll wet-refining overseas to generate early cash flows that will be used to fund construction of an onsite wet-processing facility and associated infrastructure during the second year of operation. Production is then scheduled to convert to onsite wet-processing to remove the majority of the contained quartz sand in the mined kaolinised granite and produce concentrated kaolinitic product that is shipped in bulk as filter cake for final toll wet-refining overseas in order to produce a premium bright-white halloysite-kaolin product.

Both dry-processing and wet-processing at site were evaluated during the study with wet-processing proving to produce the significantly better project economics. The prime advantages of onsite processing by a wet rather than a dry method are that it delivers greater recoveries of kaolin clay, and hence the generation of considerably higher revenues, while also providing lower site processing costs due to the operating features of wet processing and efficiencies of the plant design being considered. The inclusion of a hot drying stage under wet-processing has been made in order to comfortably meet maximum shipping moisture contents, with the benefit of recovering condensed water that will subsequently reduce the external water demand and also lower tonnage based transport and shipping costs on account of the reduced moisture content of the filter cake which outweighs the additional capital and operating costs of the drying plant. Both the initial bulk DSO material and wet-processed bulk filter cake product will be shipped through existing, or under development, port facilities.

The PFS has been developed using the December 2019 Mineral Resource estimate (*refer ADN ASX announcement dated 23 December 2019 titled "Significant Increase in Mineralised Resource for the Poochera Kaolin Project"*) of 26.0Mt of Measured, Indicated and Inferred kaolinised granite.

A mining rate of 500ktpa of raw material for the 12.7Mt Production Target over a 26 year mine life has been assumed for the PFS, producing on average 233ktpa of refined premium halloysite-kaolin product with a 15% average LOM halloysite content.

The Project is anticipated to create approximately 30-40 jobs once the onsite wet-processing plant is operating with most employees to be sourced from the local region and reside within driving distance of the site.

Marketing activity for the PFS has focussed on confirmation of product market pricing and current demand, along with production of large amounts of commercially representative products to be used to secure customer offtake agreements. Market pricing for Andromeda's premium grade halloysite-kaolin has been indicated by end users and commercial contacts in China, Japan and Europe. Production of commercial quantities will be completed in June and distributed to existing and new potential customers for final approval trials. Interest has been high with numerous requests for material being received from potential customers in several countries. Testing has also been expanded to new applications to reduce dependence on the ceramic industry and investigate potentially higher value business in Australia and overseas. First Test Minerals in the UK is preparing an up to date report on the status of the halloysite-kaolin and high-purity halloysite production and sales markets.

At an assumed selling price of A\$700/tonne (using USD exchange rate of 0.70) for the halloysite-kaolin blend, total LOM revenues of A\$4,136M are estimated to be generated by the Project. Total AISC averages A\$354/tonne over the Life of Mine (LOM) and so presents a significant cash margin to be generated by the Project. The LOM capital is a total of A\$84M which includes initial start-up capital expenditure of A\$13M and the cost of construction of a wet-processing plant of A\$56M in year 2 plus sustaining capital of a further A\$15M. An initial working capital requirement of A\$15M is required to fund start-up activities prior to revenues being received.

Total cumulative cash flow generated over the LOM is A\$1,974M (Pre-Tax). At an assumed discount rate of 8%, the Project has an NPV of A\$736M (Pre-Tax), an IRR of 175% and payback of initial capital and operating expenditures within 15 months from commencement of operations.

Additional other kaolin market areas, including supplying the High Purity Alumina (HPA) sector and halloysite nanotechnology research, have not been considered as part of the PFS and represent potential future opportunities to be evaluated.

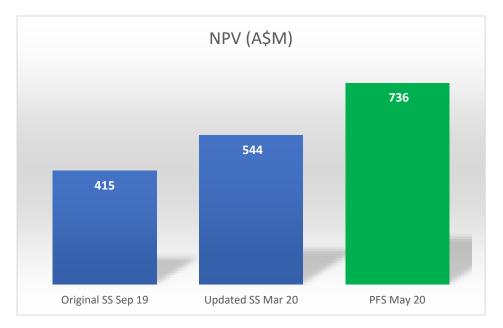
A summary of the key physical and financial statistics associated with both the PFS and the previous Updated Scoping Study released on 6 April 2020 is shown in Table 1.

**Table 1 – Key Project Statistics** 

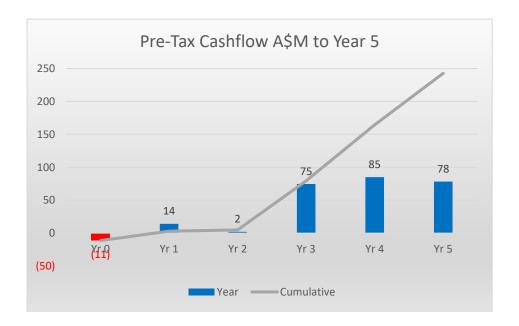
Mine Plan – Production Target	Updated SS	PFS	Change
From Measured Resources	4.2 Mt	11.2 Mt	+167%
From Indicated Resources	3.4 Mt	1.3 Mt	-61%
From Inferred Resources	0.0 Mt	0.2 Mt	Minimal
Total Production Target	7.6 Mt	12.7 Mt	+67%
Capital Costs			
Initial Capital Costs	\$13M	\$13M	No Change
Working Capital	\$16M	\$15M	-6%
Maximum Cash Requirement	\$29M	\$28M	-3%
Processing Plant Costs	\$35M	\$56M	+60%
Sustaining Capital Costs	\$11M	\$15M	+36%
Production Summary			
Mine life (years)	15	26	+70%
Processing rate of kaolinized granite (ktpa)	500	500	No Change
Stripping Ratio (Waste:Ore)	2.3	2.1	-9%
Annual Refined Kaolin Produced (ktpa)	227	233	+3%
Yield of Refined Kaolin (LOM average)	45%	46%	+1%
Project Economics			
Refined Premium Kaolin Price (AUD)	\$700/t	\$700/t	No Change
Revenue	\$2,379M	\$4,136M	+74%
AISC equivalent (LOM average)	\$374/t	\$354/t	-5%
EBITDA (LOM)	\$1,109M	\$2,058M	+86%
Pre-Tax Cashflow	\$1,049M	\$1,974M	+88%
Pre-Tax NPV (8% discount rate)	\$544M	\$736M	+35%
Pre-Tax IRR	175%	175%	No Change
After-Tax Cashflow	N/A	\$1,389M	New
After-Tax NPV (8% discount rate)	N/A	\$511M	New
After-Tax IRR	N/A	135%	New
Payback from start of site works	15 months	15 months	No Change

Note – all figures are on a 100% project basis and rounded to reflect appropriate levels of confidence

#### **EXCEPTIONAL PROJECT FINANCIAL OUTCOMES ACHIEVED BY STRONG CASH GENERATION**



The Project Pre-Tax Net Present Value (using an 8% discount rate) has increased for each study undertaken to date by Andromeda. The Internal Rate of Return has remained consistently in the order of 175%.



Pre-Tax Cashflow over the first 5 years from commencement of mining is a total of A\$243M (LOM A\$1,974M). Year 2 incorporates construction of the site processing plant funded by DSO sale proceeds. Payback period is 15 months with a maximum cash deficiency of \$28M in Year 1 which includes funding of working capital requirements until sales proceeds start to be received.



Transport and shipping and overseas refining costs comprise over two-thirds of the Project operating costs over the LOM.



The All In Sustaining Cost (AISC) for the project of A\$354/tonne sold provides an approximate 50% profit margin at a conservative selling price of A\$700/tonne for the LOM.

The anticipated timeline for the Project development is to conduct environmental impact assessments over the balance of the 2020 calendar year and prepare a mining lease application targeted to be lodged in early 2021. Subject to satisfactory progress negotiating agreements with key stakeholders, obtaining of all necessary regulatory approvals and completion of a DFS, commencement of site activities is now targeted for early 2022 with first product sales possible in mid 2022.

Known impacts of the COVID-19 pandemic have been factored into the timeframe targets but further impacts are still unknown and may affect global and local business access and therefore potentially influence these targets.

# **Key Components of Pre-Feasibility Study**

# 1. Pre-Feasibility Study Project Team

MinEcoTech Pty Ltd acted as the Study Manager and compiled the PFS based on studies and reports from historical and recent sources including employees of the two joint venture partner companies and specialist consultants. Contributors to the main aspects of the PFS include the following:

Table 2 - PFS Contributors and Consultants Used

Consultant	Scope of Work
Aldam Geoscience	Surface and groundwater hydrology
AMC Consultants	Pit optimisation
Andromeda employees	Geology and commercial
Asiaworld Shipping Services	Shipping
Bureau Veritas	Metallurgical testing
CDE Global (UK)	Wet-process metallurgy, plant design and costing
CPC Project Design	Dry-process plant design and costing
CSIRO	Halloysite testing
EBS Ecology	Flora and fauna studies
Envirocom (Andrew Minns)	<b>Environmental, Community and Permitting</b>
First Test Minerals (Frank Hart UK)	Market study and metallurgy
Ginn Materials Technology (USA)	Wet-process metallurgy
Grinding Solutions Cornwall (UK)	Wet-process metallurgy
H&SC Consultants (Simon Tear)	Resource estimation
Inside Infrastructure	Water supply
Mark Pitt (Andromeda employee)	Mine design and schedule
MinEcoTech (Paul Griffin)	Mineral Technology and Project Management
Qube Bulk	Transport and port logistics and costing
RSG (USA)	Dry-process pilot tests
Tonkin	Soils studies
TUNRA Bulk Solids	Material handling properties
University of Newcastle	Halloysite testing
WSP Global	Geotechnical study

# 2. Project Location

The Poochera Halloysite-Kaolin Project covers two main geographic areas of interest, both situated in the western province of South Australia. The current main area of focus is the Carey's Well deposit, which is located near Poochera on the western part of the Eyre Peninsula of South Australia approximately 635 kms west by road from Adelaide and 130 kms south-east from Ceduna, and which is the subject of this PFS.

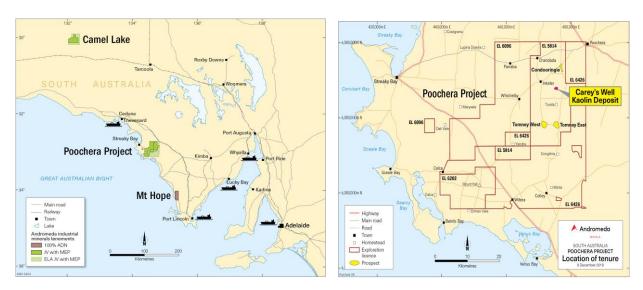


Figure 1 - Project Location Map

The Project comprises 5 tenements (including Camel Lake to the north east of the Poochera Project) covering an area of 2,069 kms<sup>2</sup> with a new tenement application of 481 kms<sup>2</sup> for ground adjacent to the Camel Lake tenement that is considered prospective for high-quality halloysite-kaolin currently lodged with the SA Department for Energy and Mining and pending approval.

The Carey's Well deposit is situated on the Tootla tenement EL 5814 within the Poochera Halloysite-Kaolin Project. The area is flat to gently undulating with much of the land cleared for sheep grazing and cereal crops, with remnant patches of mallee open scrub vegetation.

The local government authority is the District Council of Streaky Bay, with the main population and service centre being the township of Streaky Bay (c. 1,400 people). Streaky Bay has a range of community services including a police station, medical centre, high school, emergency services, recreation centre, retail and hospitality services, and numerous sporting clubs and community organisations.

# 3. Project Ownership

The Poochera Halloysite-Kaolin Project is a joint venture between Andromeda and Minotaur Exploration Limited executed in April 2018. Under the terms of the joint venture, Andromeda can earn up to a 75% equity interest in the Project by either sole funding \$6.0M over 5 years or alternatively a decision to mine is made by the joint venture partners. On 4 March 2020 the Company announced that it had met the Stage 1 expenditure commitment of \$3.0M within 2 years of execution of the agreement and had therefore earned a 51% interest in the Project. Andromeda at the same time elected to immediately proceed to Stage 2 through the sole contribution of a further \$3.0M to be spent by April 2023 in order to acquire a further 24% interest.

On Andromeda reaching a 75% interest, each party will then contribute to the Project budget as per their equity interest or otherwise be reduced as per the standard industry dilution formula. If an equity interest falls below 5%, that party's interest will convert to a 2% net smelter royalty over the Project.

The tenement package is secure and compliant with the requirements of the SA Department for Energy and Mining as at the date of this announcement.

# 4. Geology

The Carey's Well Halloysite-Kaolin Deposit is one of several halloysite-kaolin deposits located on the South Australian Tootla tenement - EL5814. With Andromeda having earned a 51% interest in the Poochera Halloysite-Kaolin Joint Venture, the tenement is now held jointly by Andromeda wholly owned

subsidiary Andromeda Industrial Minerals Pty Ltd (51%) and Minotaur wholly owned subsidiary Great Southern Kaolin Pty Ltd.

The Carey's Well Halloysite-Kaolin Deposit formed by in-situ weathering of a Mesoproterozoic Hiltaba Suite granite. The granite, where irregularly exposed at surface, is typically coarse grained and comprises predominantly microcline feldspar (potassium rich feldspar) and quartz with minor plagioclase and biotite. The microcline feldspar are characteristically a reddish-brown colour and the major source for the high-quality kaolin in the Poochera area.

During the Tertiary (66 million to 2.6 million years ago), intense weathering of the Hiltaba Suite granite produced a thick, kaolin-rich saprolitic layer. Kaolinisation was caused by tropical weathering during the Tertiary with acid bearing ground water converting microcline feldspar to kaolin minerals with remnant silica grains. The thickness of this weathering profile ranges up to about 25 metres and at the base of the kaolin-rich saprolitic layer the transition to fresh granite occurs in just a few metres.

Kaolinised granite is preserved beneath and protected by 2-20m of loosely consolidated Quaternary (2.6 million years ago to today) calcrete, clay, silt and sand. The zone of bright white kaolinised granite at Carey's Well, which has a northeast strike, is around 2,000m long and is typically 500m wide. The deposit occupies an apparent palaeo-valley filled with Quaternary aeolian sediments. In-situ the kaolin resource is unusually white and very well crystallised but when processed the clay platelets separate and disperse leaving a very fine-grained product. Importantly, in addition to micron size kaolinite platelets, kaolin is also present in parts of the deposit as halloysite, a nano-tubular form.

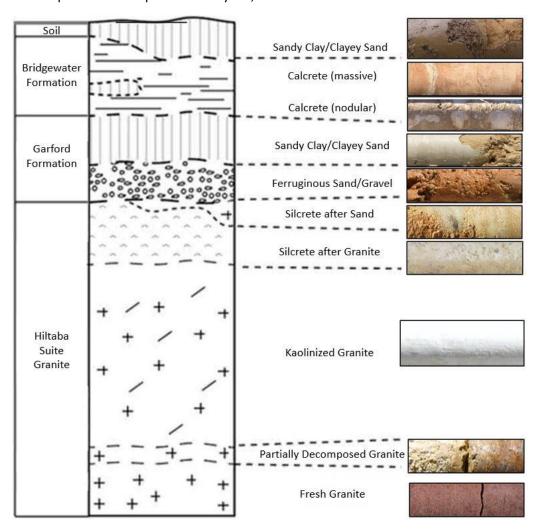


Figure 2 - Simplified Carey's Well stratigraphic column

#### Data

The Resource estimation is supported by a drilling database comprising of 248 rotary air blast (RAB) and aircore (AC) drill holes and lithology from 27 RC holes. Previous project manager Minotaur drilled a total of 224 RAB and AC drill holes in the Poochera Project Area. Of these, 153 holes (3,794.6m) were located within the Carey's Well Deposit which was drilled by Minotaur on 100m centres.

A total of 109 AC drill holes (3,266.5m) were completed by Andromeda in 2019 within the Poochera Project Area, of which 95 holes (2,737.75m) were focused on the Carey's Well deposit. Most Andromeda holes were drilled as infill at 50m centres to better define the mineralisation with minor drilling undertaken on 100m centres to extend known mineralisation.

In 2018 Andromeda undertook a bulk sample program to determine bulk rock density on the unconsolidated, porous kaolinised granite material. A total of 220 samples were collected on which density determinations were completed. The average in-situ wet bulk rock density measured for the material sampled was 1.83 tonnes/m³, whilst the average dry bulk rock density was 1.44 tonnes/m³. The average moisture content of the bulk sample material was measured to be 22 wt%.

Several existing Minotaur holes were twinned by Andromeda to confirm the validity of the old data, and from this drilling it was concluded that the Minotaur results could be used for the purpose of resource estimation. Data gathering procedures of Minotaur and Andromeda were reviewed by H&S Consultants Pty Ltd (H&SC) and confirmed that all data was collected in accordance with good practice.

#### 5. Mineral Resources

An updated Mineral Resource estimate reported in accordance with the 2012 JORC Code and Guidelines for the Carey's Well Halloysite-Kaolin Deposit was released to the market in December 2019 (refer ADN ASX announcement dated 23 December 2019 titled "Significant increase in Mineral Resource for the Poochera Kaolin Project"). The resource estimate was completed by independent geological consultancy group H&SC.

A summary of the kaolin Mineral Resource is shown in Table 3.

Table 3 – Summary of the December 2019 Carey's Well Mineral Resource Estimate

Category	Tonnes Mt	Brightness Reflectance at 457	-45μm Rec %
Measured	15.6	82.3	50.7
Indicated	4.9	81.7	49.8
Inferred	5.5	82.4	50.4
Total	26.0	82.2	50.5

(minor rounding errors)

The H&SC Mineral Resource estimate replaced the previous estimate dated 12 February 2019 which was also prepared by H&SC. H&SC used ordinary kriging for grade interpolation using their H&SC in-house GS3 modelling software. The modelled data was loaded into a Dassault Systèmes SE GEOVIA Surpac block model for resource reporting and additional mine studies.

The amount of Measured Resource increased by 80% due to the 2019 infill drilling, whilst the minus 45µm recovered material for both Measured and Indicated Resources is reduced by 5%, with the biggest decrease in the recovery grades associated with the Inferred (peripheral) material. Between the 12 February 2019 and 23 December 2019 Mineral Resource Estimates, Andromeda instigated significant upgrades to how the data was collected with improved laboratory processing of samples to remove the

plus 45-micron fraction. This included engagement with external laboratories and international kaolin expert consultants on improved laboratory assessment techniques, along with expanded quality assurance and quality control checks, and independent sign-off on Exploration Results.

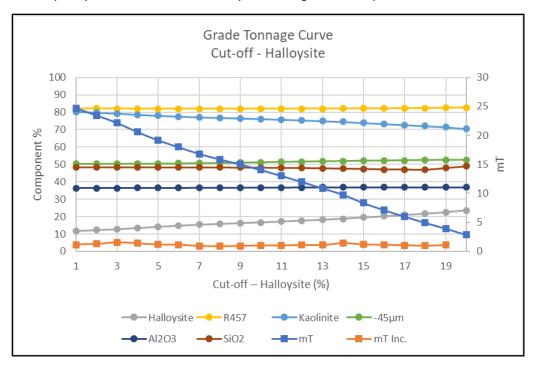


Figure 3 – Grade Tonnage Curve for the December 2019 Carey's Well Mineral Resource Estimate at incremental halloysite cut-offs

The images below show the spatial distribution of both halloysite, kaolinite and the reflectance (R457) within the minus  $45\mu m$  fraction with the PFS pit design outline shown.

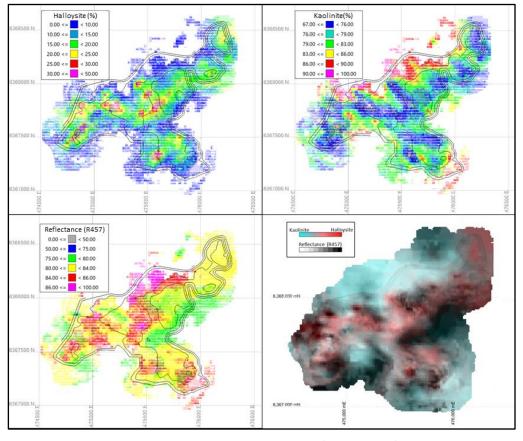


Figure 4 – Proposed pit outline over visual representation of the ratio of halloysite to kaolinite, with shading to indicate reflectance

A bulk sample program undertaken in October 2018 included the determination of the in-situ wet bulk rock density on the porous kaolinite-halloysite material, the average of which was 1.83 tonnes/m³, whilst the average dry bulk rock density was 1.44 tonnes/m³. The average moisture content of the wet bulk sample material was 22 wt.%.

Diamond drilling completed in February 2020 supports this bulk density and moisture content and provides an indication it may be slightly conservative.

Ore reserves have not been estimated to date but are planned to be compiled now that the PFS is complete.

# 6. Hydrology and Hydrogeology

A desktop surface hydrology report was done by Aldam Geoscience in April 2020. Conclusions from this report include:

- there are no defined watercourses or surface water bodies in the project area;
- the soils in the area have high infiltration rates and stormwater run-off is unlikely to occur except for more extreme (5% annual exceedance probability) events;
- any surface water flows do not drain out of the area but accumulate internally at several low points where the water will seep into the ground.

A desktop groundwater hydrogeology assessment was also completed by Aldam Geoscience in April 2020 and a numerical groundwater model was constructed in May 2020. The hydrogeology studies included a review and analysis of all existing data along with data from new monitor well measurements and new aircore and diamond drilling.

The study indicated that groundwater is likely to occur in fractured basement rocks (Hiltaba Suite granite) which includes a basal fresh unweathered granite unit, overlain by partially weathered, decomposed, granite (PDG) saprock and with the kaolinised granite (saprolite) zone above the PDG saprock layer. These units vary from saturated to unsaturated depending on location. The fresh basement rocks are expected to be of low permeability and act as a (lower) confining layer whereas the PDG saprock layer may contain significant amounts of water. The kaolinised granite (saprolite) should be of very low permeability and act as a confining layer, except in areas with high silt content.

The water in the kaolinised granite and saprock has salinity levels in the order of 36,000 ppm, and because of this salinity, the deeper groundwater will only be used for dust suppression within the mine footprint.

Overlying the kaolinised granite are sands and gravels of the Garford Formation which are likely to be more permeable than the basement units and conductive to water flow. In the western part of the deposit the sands and gravels are unsaturated, but in the eastern part of the deposit the lower levels are fully saturated with fresher water which may be broadly used, though the quantity of supply in this horizon is yet to be determined.

Overlying the Garford Formation is the Bridgewater Formation, which is unsaturated across the entirety of the Carey's Well Deposit.

Groundwater in all units is expected to flow in an eastly to south easterly direction.

In the western part of the mine, because of the relative impermeability of the kaolinised granite, and the unsaturated overburden, groundwater flow into the open pit is expected to be very low.

To the east, dewatering may be required in the saturated portion of the Garford Formation and kaolinised granite saprolite, both within the pit and on its eastern boundary, through the use of dewatering wells or sumps in the mine floor. Dewatering via wells may also be required for the PDG

saprock unit, depending on its thickness and properties. Dewatering of the kaolinised granite saprolite unit using wells is unlikely to succeed due to its low anticipated permeability, but could be done by trenches, drains and sumps.

Hydrogeology work planned in the next stage of the project includes the installation and test pumping of investigation wells in the PDG saprock and Garford Formation units, plus laboratory testing of kaolinised granite saprolite samples, to evaluate the hydraulic properties of the units described above. The results obtained will provide data for use in mine pit dewatering and geotechnical evaluations, in closure planning, and to support environmental approval applications.

#### 7. Environmental

Approximately half of the proposed open pit occurs under cleared (arable cropping or pasture) land while the remainder occurs under various native vegetation associations of varying quality. The first 13 years of mining are planned to occur on cleared land, and the remaining unavoidable project disturbance areas occur on land containing native vegetation that is grazed.

At the time of reporting the PFS, details of the site layout including location infrastructure such as access roads, water pipelines, and processing infrastructure have not been finalised. Some sterilisation drilling, to eliminate the possibility of good-quality mineralisation underneath a possible infrastructure location, is shortly to occur.

Several access road and processing site options exist, and their comparative merits are still being evaluated. One of these options involves access through a Native Vegetation Heritage Agreement area which would require a native vegetation offset by an area of equivalent or greater biodiversity value, and a potential offset area has been assessed.

A preliminary soil and land assessment of the project area was completed in April 2020 by Tonkin which will be used for the planning of rehabilitation and closure.

A desktop and field study, which referred to an earlier flora survey by Rural Solutions SA in 2011, was completed by EBS Ecology in April 2020, with findings which included:

#### Desktop assessment

• no threatened ecological communities listed under the *Commonwealth Environmental Protection and Biodiversity Conservation 1999 (EPBC) Act* are likely to occur within 10 kms of the project area.

# Flora and fauna fieldwork

- vegetation associations were assessed, using the Bushland Assessment and the Scattered
  Tree Assessment methods approved by the Native Vegetation Council of South Australia,
  within the possible mine clearance areas and in a nearby potential vegetation biodiversity
  offset area;
- 146 native flora species were recorded, including two threatened flora species (Vickery's Spear-grass and West Coast Mintbush).
- 64 native bird, one native mammal and one native reptile species were recorded during the field survey, including;
  - o four State rare bird species (Purple-gaped Honeyeater, Scarlet-chested Parrot, Gilbert's Whistler, and the Painted Buttonquail);
  - o no nationally threatened bird species;
  - o no nationally or State threatened mammal or reptile species.

The West Coast Mintbush was not observed in the mine area but it was recorded in the nearby potential offset area so a targeted follow-up survey in the mine area is proposed. Malleefowl may also possibly occur in the project area, so an assessment of LiDAR data to identify potential

Malleefowl mounds followed by targeted mound ground-truth surveys of the LiDAR data are planned.

The potential occurrence of West Coast Mintbush and/or Malleefowl in the mine area is not considered to have a major impact on the project because if nationally threatened flora and fauna are detected within the project area, the location and design of infrastructure such as roads, pipelines and processing plant areas, can avoid and minimise any potential impacts. Should it not be possible to avoid impacts to nationally listed species, then a referral under the EPBC Act may be required, which would be determined by an EPBC self-assessment.

# 8. Social and Community

The Company has been involved with the site for the last two years and has regularly engaged with key stakeholders in the local community over that period. Positive working relationships have been established with directly affected landowners, the District Council of Streaky Bay and the Wirangu Native Title Claimant Group.

## **Land access**

Most of the project is located on freehold land and Andromeda is currently negotiating a range of commitments with private landowners for land access.

The Company is also in ongoing discussions with representatives of Local and State government, on matters including access to roads and the Native Vegetation Heritage Agreement area immediately southeast of the mine area.

# **Native Title and Cultural Heritage**

Exploration activities conducted to date, and the proposed Carey's Well mine area, are located on privately owned (freehold) land where Native Title is extinguished.

It is acknowledged that the Poochera Project area lies within the Wirangu Number 2 Native Title Claim (SC1997/006) area southwest of the Eyre Highway. While the mine area is in disturbed agricultural land, an Aboriginal heritage survey will be carried out to identify any Aboriginal artefact sites or sites of cultural significance. Andromeda is working with the South Australian Native Title Services to facilitate this work.

#### 9. Geotechnical

Based on PQ size triple tube diamond drilling of the overburden and the kaolinised granite zone, a new geotechnical study has been undertaken by Geotechnical Consultancy WSP Global. Work included core logging, laboratory soil mechanics testing, and pit slope stability modelling.

The guidance on batter slopes for the material types encountered during the investigation is:

Overburden Inter Ramp Angle 34°
 Kaolinised Granite Inter Ramp Angle 23°
 Composite slope Overall slope angle 27°

These typical batter slopes were indicative only and are now regarded as worst case, being based on maximum pit wall heights. The slopes are able to be adjusted based on proposed new hydrogeological modelling and the open pit dewatering assessments along with more detailed slope stability modelling based on actual, commonly lower, pit wall heights.

# 10. Mining and Mine Design

**NPV Discount Rate** 

The Mineral Resources underpinning the Production Target were announced by the Company on 23 December 2019. A Whittle pit optimization was carried out by AMC Consultants using the Resource Model *pooch\_ok\_working\_121219.mdl*, and the Whittle pit optimisation input parameters are shown in Table 4.

Description	Unit	Value
Halloysite-kaolin Product Price	AUD\$ / t product	700
Site Plant Metallurgical Recovery	%	78
Site Processing cost	\$/t feed	32
G&A Cost	\$/t feed	4
Shipping Cost	\$/t concentrate	103
Refining Cost	\$/t concentrate	88
Refining Yeild	%	92
Sustaining Capital Cost	\$/t product	18
SA State Royalty Rate	%	3.5
Overall Geotech Slope (Assumed)	Degree angle	45*

Table 4 - Whittle optimisation parameters

Because of the shallow depth of the pit and its large horizontal extent, the Whittle optimisation is driven mainly by the resource, and it is relatively insensitive to the input costs. Since the Whittle optimisation was done, several of the input cost assumptions have been favourably improved.

%

8

The pit shell selected from the Whittle optimisation work was pit shell eight from optimisation run number 3, which is shown in Figure 5.

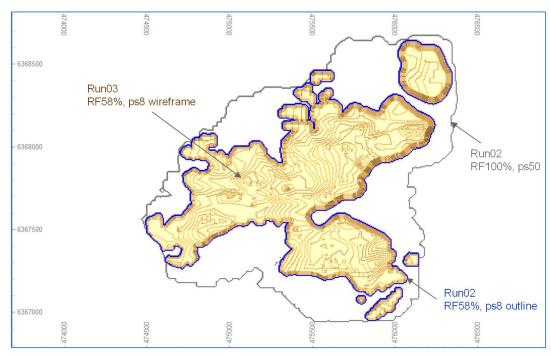


Figure 5 - Selected Whittle Optimisation Pit Shell

<sup>\*</sup>Slope used in Mine Design is 27°

Based on the selected Whittle optimisation pit shell, a detailed mine design was produced as shown in Figure 6. The mine was designed with overall pit slopes of 27° which is flatter than the pit shell slopes of 45°. The mine was designed to target the measured and indicated resources and avoid small sub-pits in the Whittle optimisation that would be difficult to mine. The detailed mine design also features 5m berms every 5m vertically, with inter-berm face angles of 35° in the kaolinised granite and 65° in the overburden, and 30m wide pit haulage ramps at a 10% gradient. The exposed kaolinised granite on the floor area of each stage pit is approximately 200m x 200m to allow adequate working room for mining equipment. The resultant LOM pit design is approximately 2 kms long in a south-west to north-east direction and a maximum of 1.2 kms in a north-west to south-east direction.

17 stages of mining were designed, as shown in Figure 6 and tabulated in Table 5, and these will be mined sequentially with mining overburden and reject sand from the process plant to be backfilled into each previous stage void.

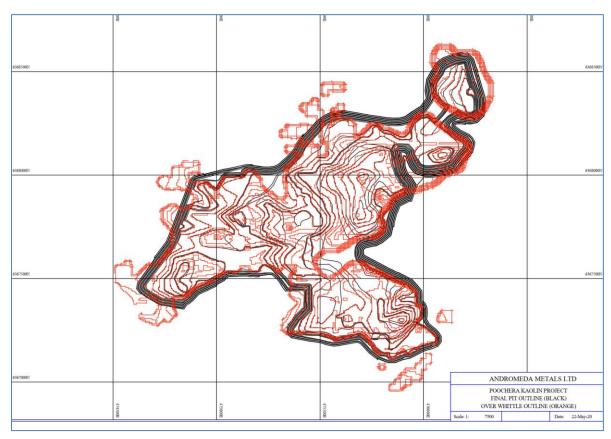


Figure 6 – The PFS pit design (black) compared to the selected Whittle Optimisation Pit Shell (red)

Mining is planned to commence with a starter pit at the shallower south western end of the mine and proceed east over the next seven years before mining the southern portion of the deposit for the next six years to year 13, then reverting in a north-east direction over the remaining thirteen years to produce a final mine life of 26 years.

There are several options for the processing plant location, and one such location east of the pit was used in the mining cost estimation.

Production is envisaged to be managed by Andromeda and undertaken by an earthmoving contractor using mainly a bulldozer and scrapers supplemented by an excavator and trucks to haul the kaolinised granite and waste to respective stockpiles. The overburden earthmoving is more economically done by bulldozer and scrapers, but the excavator and trucks can provide better selectivity in the deeper and tighter parts of the pit. Approximately half of the scrapers and trucks delivering kaolinised granite to the

Run of Mine (ROM) stockpile will be loaded by the plant front end loader with reject sand for return to the deeper parts of the pit as backfill.

The in-situ overburden and kaolinised granite can be easily excavated because it is predominantly soft and easy digging, except for thin bands of harder near surface calcrete rock and silcrete rock just above the kaolinised granite. Diamond core sample analysis indicates these harder materials are amenable to bulldozer ripping but provision is made for limited light blasting of the silcrete.

Overburden from the initial starter pit is planned to be deposited into the overburden stockpile/landform and subsequent overburden placed into the previous mined-out area.

Dilution must be avoided for product quality, and to achieve this a mining ore loss of 10% is assumed and a dilution factor of 0% has been adopted.

The average dry bulk rock density of 1.44 tonnes/m<sup>3</sup> in the December 2019 Mineral Resource and the moisture content of 22% has been used in this PFS.

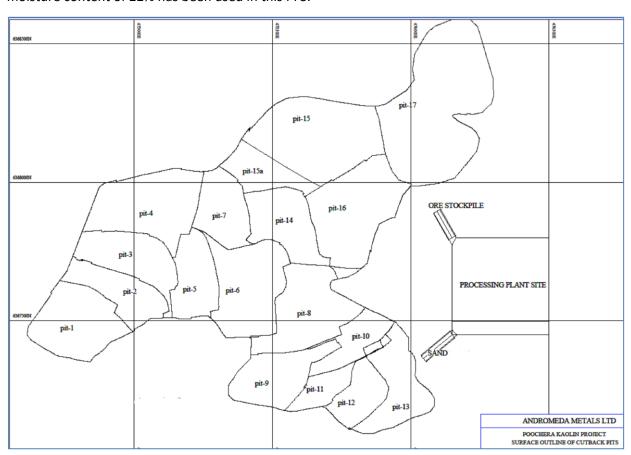


Figure 7 – Mining Stages

The mining schedule has been developed to provide nearly constant plant throughput rates of 500ktpa (dry basis), giving 26 years operating life. The Production Target has total material movement of approximately 26.9M bank m³ (BCM) of total earth moved and delivering 8.8Mbcm, or 12.7Mt, of kaolinised granite to the ROM stockpile. Pre-stripping of starter pit overburden is scheduled to start three months before the commencement of shipping.

**Table 5 – Mining Production Target** 

Pit	Total	Overburden	ROM Fe	ed, 90% mi	ning reco	overy, a	s mined		
Stage	Material	incl. topsoil	DSO or	plant feed	miı	nus 45 n	nicron por	tion	Stripping Ratio
	Mined					kaolin	halloysite	h+k clay	Overburden
	Mbcm	Mbcm	Mbcm	Mt	Mt	%	%	%	to ROM feed
1	1.1	0.7	0.4	0.6	0.3	74	17	91	1.9
2	0.9	0.6	0.4	0.5	0.3	78	16	94	1.6
3	1.0	0.6	0.4	0.5	0.3	79	16	95	1.8
4	1.4	1.0	0.4	0.5	0.3	80	15	95	2.8
5	0.9	0.6	0.3	0.4	0.2	76	16	92	1.9
6	1.6	1.2	0.4	0.6	0.3	76	15	91	2.9
7	1.1	0.7	0.3	0.5	0.2	82	11	93	2.2
8	1.5	1.2	0.4	0.5	0.2	77	13	90	3.2
9	0.9	0.5	0.3	0.5	0.2	76	17	93	1.6
10	0.9	0.5	0.4	0.5	0.3	75	18	93	1.4
11	0.6	0.3	0.3	0.4	0.2	80	12	92	0.8
12	0.7	0.3	0.4	0.5	0.3	78	13	91	0.9
13	1.2	0.7	0.5	0.8	0.4	82	11	92	1.4
14	1.4	0.9	0.5	0.7	0.4	73	21	94	1.8
15	3.5	2.3	1.2	1.7	1.0	84	11	95	2.0
16	3.9	2.4	1.6	2.2	1.2	77	16	94	1.5
17	4.3	3.5	0.8	1.2	0.6	77	16	92	4.4
LOM Total	26.9	18.1	8.8	12.7	6.6	78	15	93	2.1

The PFS Mine Plan results in a Production Target of mining the following summary quantities:

Table 6 - Mining Quantities by Category

Category	Tonnes Mt	% of Target	% of Category	Resource Tonnes Mt
Measured	11.2	89	72	15.6
Indicated	1.3	10	26	4.9
Inferred	0.2	1	3	5.5
Total	12.7	100	49	26.0

# 11. Metallurgy and Processing

Metallurgical testwork has been undertaken at laboratory and pilot scales, historically and more recently, to assess the response of the Carey's Well kaolinised granite to both dry-processing and wet-processing approaches. Wet-processing has repeatedly been shown in pilot scale trials to be effective at achieving high recovery of the Poochera kaolin.



Figure 8 – Raw kaolinized granite, after auger sampling. The visible lumps are easily broken by hand

#### **Transportable Properties**

Testwork has been done by TUNRA Bulk Solids on material handling flow properties of both the DSO (ROM) material and the wet-processed kaolin clay, including an assessment of the Transportable Moisture Limit (TML) which applies to materials being shipped by ocean. Testing is required at the time of loading to verify that the moisture content of cargo being loaded into the hold is below the TML.

The DSO material has a TML of 16%, while that of the wet-processed kaolin clay is 26%.

# **DSO (ROM) Ambiant Drying**

The in-situ moisture content is approximately 22%, and a target TML moisture content of under 16% is required. It is known from the handling and transport of the DSO (ROM) bulk samples that the kaolinised granite has a tendency to very quickly dry out, and it is proposed to utilise ambient drying of the DSO material at the mine to achieve the required moisture content. This can be done by ripping the material in the pit floor, where possible, a few days before loading and hauling from the pit, and in addition spreading it out on a drying pad, with occasional turning by a grader to achieve uniform drying. A pad of approximately 6 Ha is sufficient in area to achieve the required reduction in moisture during the two slowest drying months of June and July. A stockpile of dried material will be maintained on site to allow for rain occurrences so that DSO material transported from the mine is always below the shipping TML.

#### **Proposed Variability Testing**

The pilot scale testwork done to date has shown consistent results for processing performance, but this may be because the bulk samples used in the testwork came from a restricted area, in the central/eastern part of the resource. To eliminate the remote possibility that markedly different pilot scale results would be obtained in the western, south-eastern and north-eastern extremities of the deposit, work on "variability testing" will be done in the DFS phase.

#### Comparison of site processing options

The PFS examined DSO unprocessed and both site-based dry and wet-processing options and determined that an initial phase of DSO based production followed shortly after by onsite wet-processing is the preferred option. The dry-processing option is extensively described in the Scoping Studies.

The major benefit of wet-processing over dry-processing is the recovery of additional valuable kaolin clay, and the filter cake gives a slightly higher refinery recovery than the unprocessed DSO feed.

#### **Wet-Processing**

Testwork for wet-processing was carried out by Grinding Solutions in Cornwall, UK and by CDE Global in Cookstown, Northern Ireland. The work involved breaking up the raw kaolinised granite feed to pass 4mm, then treating it as a slurry in a high attrition scrubber to rub the kaolin clay off the sand. The resulting slurry was subsequently passed through a hydrocyclone to separate the -45 $\mu$ m kaolin clay from the coarser sand.

Following the pressure filters, a hot drying stage is required to comfortably meet maximum shipping moisture contents and further reduce the moisture content, resulting in lower tonnage-based transport and shipping costs. The dryer can be equipped with a vapour condenser to recover water and thus reduce the plant water demand. The capital and operating cost of the site filter cake drying stage is lower than the transport and water cost savings and provides a further improvement in the overall operating costs.

Based on the testwork, indicative metallurgical performance has been anticipated and, to allow for pilot to full plant scale up factors, the metallurgical performance parameters for the PFS have been adopted as shown below:

		Anticipated	Adopted
		By Testwork	for PFS
•	Metallurgical recovery of kaolin clay (% of -45μm recovered)	92-95%	90%
•	Grade of the hydrocyclone overflow (content of -45µm)	85-90%	85%
•	Process plant mass yield		54%
•	Filter cake solids content		70%
•	Dryer filter cake solids content		90%

Further testwork will be done in the DFS stage to confirm these parameters for a variety of plant settings and different parts of the deposit.

The process design has been developed from the metallurgical testwork to meet the design objective of 500kpta throughput and includes the following broad areas:

- Front-end loader feed from the ROM stockpiles;
- A hopper, apron feeder and conveyor;
- Power station heat supply, LPG gas heater, and heat recovery equipment;
- Dryer with a wet scrubber for dust collection and water vapour recovery;
- Dried filter cake storage;
- Reject sand handling;
- Road train loading area.

The plant capacity is sized at nominally 75 dry tph. The filter presses and associated dryers are based on three independent trains with a combined capacity of 40 tph. The plant will operate continuously with an assumed operating time of 8,000 hours per year for 91.3% utilisation.

The flow sheet is presented in Figure 9 and a general arrangement of the conceptual plant design is shown in Figure 10.

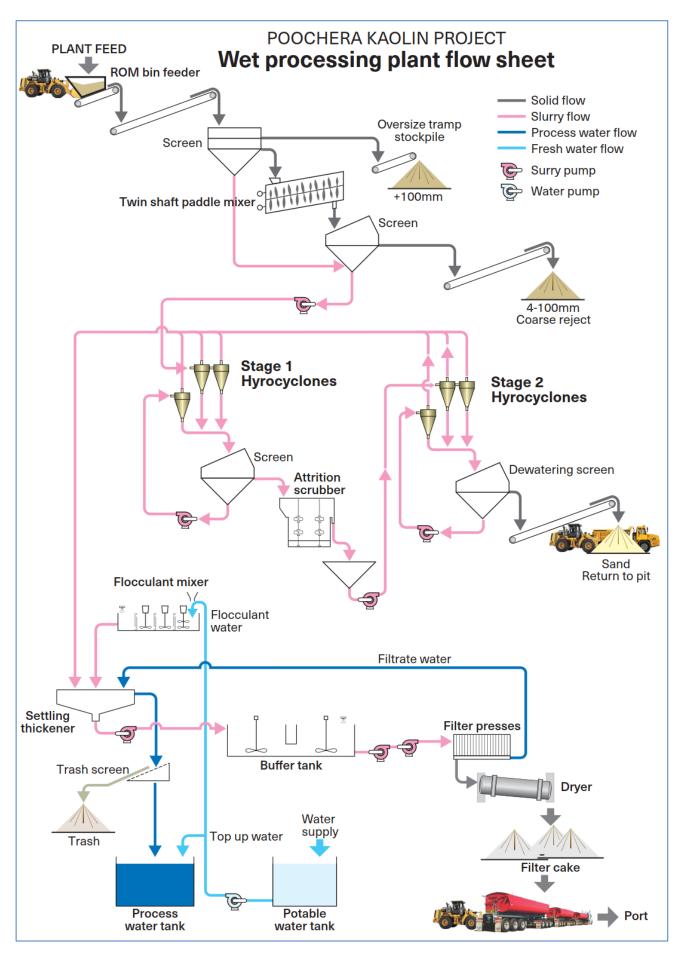


Figure 9 – Wet Processing Plant Process Design Flow Sheet

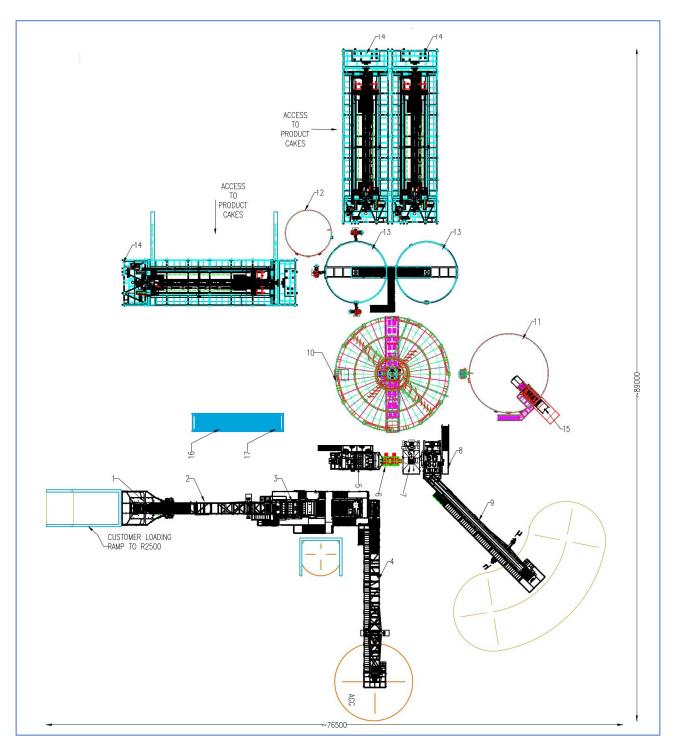


Figure 10 – Wet Processing Facility General Arrangement

A description of the wet plant is as follows, with the numbers referring to components in the general arrangement in Figure 10 above:

- From the ROM stockpiles a front-end loader feeds the ROM hopper, and an apron feeder (1) and conveyor (2) feed a first stage coarse pre-screening plant (3a) which removes tramp size +100mm material.
- Associated with the coarse screening plant is a twin shaft paddle mixer (log washer) (3b) that breaks up the -100mm material with a target size of -4mm.
- A wet screening plant (3c) removes oversize (+4mm) material which is transferred by conveyor (4) to a coarse reject stockpile.
- The wet screened -4mm material is pumped as a slurry through the Stage 1 cyclones (5).

- The cyclone underflow coarse material ( $+45\mu m$ ) is directed to attrition scrubbers (6) which rub the kaolin clay from the associated sand.
- The slurry of scrubbed sand and kaolin clay is directed through a second set of cyclones (8a) with the coarse underflow sand passing over dewatering screens (8b) to produce damp sand for return to the open pit.
- The finer cyclone overflow kaolin clay from the cyclones flows to a thickener (10) which draws off a thick slurry of predominantly kaolin clay.
- The kaolin clay slurry is held in buffer tanks (13) before being batch pumped at high pressure into three banks of filter presses (14) and pressed to form solid filter cake.
- Filtrate water from the filter presses is returned to the thickener for recycling.
- The thickener overflow water passes through a trash screen (15) to the process water take (11) for recycling to the various parts of the circuit.
- The filter cake is fed to a dryer (not shown in Figure 10) to reduce the moisture content from approximately 30% to 10%.
- The dried filter cake is then stockpiled and loaded onto road trains for delivery to the port.
- Fresh water is delivered into a potable water tank (12) from where it is pumped as required to the process water tank (11) and a small containerised mixing plant (16) that makes up a flocculant solution that helps the kaolin settle in the thickener.
- Freshwater may also optionally be pumped to the filter presses for a cake wash process that flushes freshwater through the filter cake while it is inside the press to reduce the salt content of the product filter cake.
- The plant is controlled by a programmable logic controller located in a central control room (17).

#### 12. Plant Infrastructure

The plant is proposed to be located near the pit, and the following site infrastructure items are proposed to be constructed:

- Site and internal access roads;
- Water control drains and bunds;
- ROM ore stockpiles;
- Administration office complex and emergency response building;
- Mining operations and maintenance facilities;
- Process plant workshop and store and reagent store;
- Assay laboratory:
- Infrastructure
  - Water supply pipeline;
  - Power station;
  - Power station LPG storage;
  - Mobile equipment diesel fuel storage.

The water supply pipeline and sealed road construction will be done at the same time as the plant construction utilising the same project management and equipment resources.

#### 13. Water Supply

The wet-processing plant is designed to recycle water inside the plant to minimise water consumption and water is only lost from the plant in the damp filter cake product and in the damp sand returned to the open pit.

In addition to the main demand for processing, water is also required for dust suppression on the stockpile areas and haul roads and in minor amounts at the site offices and facilities. Water used for dust suppression can be minimized by using dust suppression additives.

A small amount of ground water may be recovered from open pit dewatering and can be used for internal mine road dust suppression, but this cannot be relied upon.

During heavy rain events, water flows within the mine operations area will be captured and can be used for processing and dust suppression. Due to the unreliability of such rain events, these also cannot be relied on for project water supply planning.

Discussions are in the early stages with SA Water for a future water supply. SA Water have indicated it is possible for a water supply to be made available to support the project. The water supply would be subject to any required network upgrades to ensure water supply services to existing customers are not impacted.

The PFS includes preliminary operating cost estimates for water supply by road tanker during the initial DSO stage, along with capital costs to augment the network for a new water supply pipeline and ongoing water charges. More detailed studies on alternative pipeline options will form part of the DFS.

#### 14. Infrastructure and Services

Access to the site from Adelaide is excellent via the Eyre Highway with most fuel and operational supplies likely to be freighted to site via this route. Within the Project area, access is available by a network of well-maintained District Council bitumen and gravel roads. The mine and plant can be accessed by a planned mine road from the Poochera-Port Kenny Road several kms to the east, via a route to be determined by environmental, land ownership, terrain, and haul distance considerations.

Until completion of the sealed access road, a high standard of road maintenance and dust control by a semi-trailer water tanker and regular grading will be maintained. The water tanker will also provide water deliveries to the site during this interim period.

Project site personnel, anticipated to be approximately 30-40 people, are likely to be housed in Streaky Bay or other localities within self-driving distance from the mine. Overflow and shutdown motel accommodation is available in Streaky Bay. A bus service from Streaky Bay is intended for shift changes.

The power supply adopted in the PFS is based on LPG fueled generators on site to be supplied on a Build-Own-Operate (BOO) basis by an independent power producer under a price per kWhr contract, with the generator waste heat able to be used on the process plant driers. Grid power via the construction of a new power line may be considered in the longer term.

It is proposed that LPG will be supplied and delivered under an all-inclusive \$/L or \$/GJ contract.

# **15. Product Transport**

The site is well serviced by roads and regional ports with transport to the shipping port options under consideration to be by truck. Both the DSO and the filter cake product from the wet-processing plant can be transported in side-tipper trailers.

A transport and logistics study by Qube Bulk has been prepared and indicative costs from this have been used to determine road transport, port storage and ship loading estimates. Highest cost scenarios from the study have been assumed for the financial evaluation. Further refinement and clarification of costs, along with more detailed consideration of port options, will be undertaken during the DFS phase.

# 16. Product Shipping

Indicative break bulk shipping costs for DSO and filter cake material have been obtained from Asiaworld Shipping Services for shipment of product to port options in northern and southern China, and these have been applied in the PFS financial evaluation.

# 17. Refining

Direct Shipping Ore of about 50% contained kaolin clay is planned to be initially shipped for toll wet-refining until an onsite wet-processing plant is completed during year two of the project. The onsite wet-process would produce filter cake with approximately 85% contained clay to be shipped to toll refineries.

During refining of the DSO or site processed material, the following processes will occur:

- fresh water rinsing to reduce the salt content of the product to meet customer specifications;
- adjusting the particle size distribution of the product to meet customer specifications;
- further reducing the content of deleterious elements such as iron, titanium and potash;
- increasing the kaolin clay content grade to a minimum of 99%;
- bagging the product for distribution and sale to regional and export markets.

A requirement of the kaolin refineries being considered by Andromeda is good low-cost inbound bulk material and outbound packaged product freight logistics, along with ample supplies of fresh water for salt removal by rinsing.

In common with other manufacturers in the premium ceramic kaolin clay market, Andromeda proposes to add a few percent of bentonite clay to enhance the plastic properties of the product.

The product will be packaged in either 20kg paper bags or 1,000kg FIBC bulk bags depending on the various customers' individual requirements.

The Company is progressing toll-refining options with the management of several refining facilities in China and Japan. All these facilities have a shortage, or even nil supply, of suitable quality raw material, and so have spare toll processing capacity to manufacture final saleable product to Andromeda's specifications. The technical parameters of the wet-process refineries are in line with or, because of enhanced equipment such as centrifuges and magnetic separators, superior to the basic pilot plant conditions under which the Poochera kaolin has been previously assessed. All of these facilities have been visited by Andromeda staff and audited to determine their suitability to manufacture product that will meet the technical specifications of the wet-refined pilot plant product already approved by potential customers. An important section of the DFS stage will be to negotiate in detail the technical performance, as well as the costs, of the selected wet-refinery options.

The indicative available capacity and refining fees of several wet-refining facilities have been received and are used in the PFS financial model. Ongoing negotiations for toll refining agreements will continue in the next phase of the project.

Because of lower handling costs, higher refinery recovery of the valuable halloysite-kaolin clay, and savings on refinery residue disposal costs, bulk wet-process filter cake has a lower refining cost than the DSO material and the previously considered dry-processed material delivered in bulk bags.

#### 18. Testing, Marketing and Sales

#### Confidentiality

Much of the detail of market demand and pricing information is unable to be publicised as it was obtained under a confidentiality agreement or is commercially sensitive to Andromeda and its future customers.

## **Product Properties**

ParlaWhite<sup>®</sup> (PW) is a trademark registered with IP Australia, named after the Parla Peak landmark in the Poochera locality, with PW90 and PW70 applying to Poochera Bright White Halloysite-Kaolin product that is respectively >90% and >70% passing  $2\mu$ m.

Table 7 below compares the tested properties of the PW90 product produced in the Minotaur pilot plants against some competition kaolin and halloysite-kaolin products that are currently sold into the ceramics market. It should be noted that the China 1 halloysite-kaolin grade has severely reduced capacity and consistency problems.

Table 7 - Comparison of Andromeda Premium Grade Product with Commercial Grade Ceramic Kaolins

Duramantur	Product								
Property	PW90	China 1	China 2	Europe 1	Europe 2	Europe 3			
Brightness (ISO)	90	80	80	80	87	85			
Chemical Analysis (%)									
SiO <sub>2</sub> 45.3 49.3 48.0 52.0 48.0 48.0									
Al <sub>2</sub> O <sub>3</sub>	38.0	35.5	36.0	34.0	37.0	36.5			
Fe <sub>2</sub> O <sub>3</sub>	0.35	0.30	0.30	0.43	0.47	0.68			
TiO <sub>2</sub>	0.03	0.03	0.02	0.17	0.01	0.02			
MgO	0.17	0.27	0.04	0.26	0.25	0.30			
Na₂O	0.38	0.08	0.24	0.01	0.15	0.10			
K <sub>2</sub> O	0.14	2.36	1.20	0.30	1.20	1.65			
		Mineral	ogical Analysi	s (%)					
Halloysite (%)	20	30	-	-	10	-			
Kaolinite (%)	80	70	90	80	67	80			
Particle Size (%)									
< 2 μm	90	80	80	82	85	70			
< 1 μm	78	50	60	50	70	60			

This clearly demonstrates the high quality of the Andromeda Poochera product, and why there is such strong market demand around the world.

Testing of Andromeda products has been expanded to new applications globally, to expand beyond the Chinese ceramic industry, and investigate potentially higher value business in Australia and overseas, by virtue of the halloysite component.

#### Production and testing of commercial trial scale samples

The strong interest received to date is based on laboratory scale ceramic testing of the premium wetrefined product previously produced by the Company at its pilot plant facility, or more recently by other pilot plant facilities in the UK and the USA. Additional refinery testing is currently in progress at commercial scale in China and Japan, and at pilot scale in the USA and Germany. The commercial scale trials in China and Japan have been delayed by the COVID-19 pandemic and other factors, but are now well in progress and due for completion in June 2020. Approximately 50 tonnes of material will be produced to provide commercially representative amounts of product to potential customers for final approval trials which is an essential part of the marketing and sales effort.

These customer approval trials require tonnage scale quantities of product to be provided because the Andromeda halloysite-kaolin product is one of several different raw material ingredients typically used

by customers in a clay body formulation (recipe), and adopting a new product involves a reformulation of the mix and testing by forming and kiln firing, in the factory laboratory and the full-scale production line. These customer trial factory sized batches of ceramic items incorporating the halloysite-kaolin will now be completed as part of the DFS studies. Andromeda expects to have examples of final ceramic products available following this testing phase.

**Table 8 – Details of Commercial Scale Processing Trials** 

Processing Plant	Location	Product Quantity (tonnes)	Product	Production Testing Status	Customer Acceptance Testing Status
Yamada	Japan	4	PW90 Premium Grade	In Progress	Awaiting Trial Samples
Yamada	Japan	5	PW70 Medium Grade	Planned in late June	Awaiting Trial Samples
Beihai Kaolin	China	20	PW90 Premium Grade	Waiting for plant to reopen	Awaiting Trial Samples
Harvest Kaolin	China	10	PW90 Premium Grade	In final stages	Awaiting Trial Samples
Zhanjiang	China	10	PW 70 Medium Grade	Completed	In progress

As well as generating the tonnage scale marketing samples for customer acceptance testing, the production testwork will also provide more advanced plant design data, and refinery operation settings, which comprises another part of the DFS stage. The high interest in Andromeda products has seen requests for product samples being received from numerous customers in many countries.

## **Market Volumes**

The PFS proposes an onsite processing plant feeding Poochera halloysite-kaolin to one or more global refineries. Refining by wet conventional processes has been proven to yield desirable products with low levels of impurities that give excellent properties in ceramics applications, permitting sales into the international porcelain and high value ceramics market.

Market demand for this type of mineral is extremely high and growing because global production is reducing with the closure of several significant high-quality sources. The Company considers the 26 year supply life identified in the PFS makes Poochera halloysite-kaolin a valuable long-life strategic source to customers which is not currently available to them and has given rise to the extremely high and growing level of market interest.

Because Andromeda offers both superior quality and long life reliable strategic supply, potential customers in Japan, Europe and throughout Asia have expressed strong interest. Eight Chinese ceramic companies have signed Letters of Intent (LOI's) for 211,000tpa of the premium wet-refined grade of Poochera halloysite-kaolin, and this market volume is the basis of the PFS. In addition to the 211,000tpa covered by letters of intent in the Chinese high value ceramic market, a further 22,000tpa can be produced under the PFS Production Target, and because market prices in Japan and Europe are higher than in China, it is intended to service these markets with this additional product.

In addition, but not considered in the PFS, LOI's have previously been provided for 405,000tpa of DSO and 307,000tpa of dry-processed product.

#### Sales

Whilst the international market for kaolin is based on confidential individual supplier vendor negotiations, Andromeda's staff and its international industry specialist advisors have a good understanding of market volumes and prices. This information has recently been updated by a number of industry sources and is used in the PFS. First Test Minerals in the UK are also currently leading an up to date global market survey of halloysite-kaolin and high-purity halloysite, to include all known existing production and sales information.

Based on advice from the Company's industry advisors and discussions with its agents and potential customers, the prices applicable to the PW90 grade of product on a packaged ex-works basis are in the range of USD\$500-600/t for sources in China, with higher prices applying in other countries. Adopting the lower end of this range for the PFS of US\$500/t and a 0.70 USD:AUD exchange rate results in a rounded down packaged ex-refinery price of A\$700/t.

For industrial mineral products, supply/sales agreements are specific to customer requirements and are made with numerous parties including direct customers, agents who are paid commission for securing sales, and distributors who purchase stock for supply to their own downstream customers. Once commercial scale representative products are available the process of demonstrating the expected consistency and quality will to be put in place to secure binding supply agreements. At this stage testing and discussions are in progress with agents/distributors covering Australia/NZ, Asia (two large distribution houses), China (four companies), India, the Middle East and Europe. This is in addition to the direct customers who have already signed offtake letters of intent, customers where testing is in progress, and new potential customers that have either requested samples or are being targeted.

It is common for binding sales contracts to be negotiated closer to the completion of a DFS, or even after it, once bulk final product has been distributed and tested, and that there is a higher level of confidence between the buyer and seller about delivery timing, quantity, quality specification and pricing.

# 18.1. Other Kaolin Market Areas Not Considered in the Pre-Feasibility Study

#### **Conventional Grades**

In addition to the wet-refined product, other potential customers in China and Japan have given technical approval and signed offtake Letters of Intent (LOI) for a combination of unprocessed Direct Shipping Ore (DSO), and dry-processed product totaling 700,000 tpa. While these are lower priced markets, they also have much lower production costs. Enquires for DSO product continue to be received as supply of high-quality, consistent material is depleted around the world.

An option to produce PW70, a market-ready product from the wet-process plant at Poochera which could be sold directly into domestic and export markets, will be evaluated as part of the DFS.

Other applications are also currently under testing and include:

- Remediation of contaminated soils (Australia and USA)
- Concrete (Australia)
- Underground backfill and shotcrete in Mining (Australia)
- Fluid Cracking Catalysts (China and USA)
- Medical anti-viral facemasks (Europe)

#### **High Purity Alumina (HPA)**

HPA metallurgical testing of Poochera halloysite-kaolin has indicated that high level 99.99% (4N) purity could be achieved with only one stage of purification, and this result was confirmed by

additional rounds of testing. This puts the Andromeda halloysite-kaolin into a category of its own as a premium feed for the HPA production process. Further testing has since been conducted, and opportunities for collaboration are being considered by Andromeda to realise the full potential of becoming involved in this rapidly growing sector.

#### **High Purity Halloysite**

Global occurrences of high purity halloysite are extremely rare, and demand is growing significantly due to its use in a large range of new high-tech applications. The current market price for a suitable grade of halloysite is approximately US\$3,000/t, but it is not commercially available in significant quantities of the required form. Exploration drilling in the Poochera area and samples from Camel Lake have shown the existence of high purity halloysite on the joint venture exploration tenements, and more extensive exploration is being planned to quantify these occurrences. Samples of high-purity material obtained from drilling in the Poochera area are currently being tested in a range of new high-tech applications to determine the business potential.

# Halloysite Nanotechnology Research

Application research commenced in 2017 and is ongoing on the natural nano-properties of Poochera halloysite by researchers at the Global Innovative Centre for Advanced Nanomaterials (GICAN) based at the University of Newcastle. This world-leading work includes carbon capture, hydrogen and energy storage and the manufacture of carbon nanostructures using halloysite nanotubes (HNT). A separate 50/50 joint venture has been formed between Andromeda and Minotaur to work with GICAN to develop intellectual property associated with halloysite nanotechnology research for potential future commercialisation. Recent grant applications have been made for research into the existing application areas, along with new projects in medical and agricultural applications.

# 19. Capital Costs

A summary of the adopted PFS capital costs is presented in Table 9.

**Table 9 - Capital Cost Estimate** 

Area	Year 0 A\$M	Year 1 A\$M	Year 2 A\$M	Years 3-26 A\$M	Total A\$M
General Site Costs	12				12
Mining Mob & Establish	1				1
Initial Capital	13	l.			13
Wet Processing Plant			30		30
Plant Dryers	l.	l.	14		14
Commissioning, First Fills and Spares			1		1
Processing Plant			45		45
Deferred Infrastructure			11		11
Sustaining Capital	l.	l.		15	15
Total Plant & Equipment	13	0	56	15	84
Working Capital		15			15

At the date of this announcement there has not been an audit of the capital cost estimates undertaken. This will be done on the more thorough cost estimates produced during the DFS and before financial commitment to commence the Project.

# 19.1. Initial Capital Cost

The estimated initial capital cost is A\$13M (±20%) for construction of an access road, mining mobilisation and site establishment, and general site costs.

A total contingency of 20% has been added to all the capital base cost estimates.

The capital cost estimate does not include the cost of any mining equipment as this is incorporated in the budget earthmoving contract rates.

# 19.2. Working Capital

A working capital allowance of A\$15M is assumed for pre-striping overburden, pre-mining of ROM blending stockpiles, administration, shipping and toll processing operations which occur before these are offset by receipt of revenues from sales.

## 19.3. Site Processing Plant Capital Cost

The cost estimate for the deferred plant construction has been developed with input primarily from CDE Global and Andromeda staff.

The plant is costed on the basis of a turnkey cost estimate from CDE Global for the wetprocessing facilities. The plant civils and concrete foundations, the drying facilities, product handling and plant infrastructure are costed on the basis of being designed and built on an engineering, procurement and construction management (EPCM) basis.

The wet-processing plant capital cost estimate is A\$56M which includes:

- Direct manufacturing costs of the CDE Global processing equipment, shipping, construction and commissioning supervision;
- Direct manufacturing costs of the filter cake drying equipment, shipping, construction and commissioning supervision;
- Plant civils and foundations;
- Plant assembly and wiring;
- Indirect costs associated with the design, construction and commissioning of the new facilities;
- Insurance, operating spares and first fills;
- Provision of a pipeline-based water supply;
- Upgrading and sealing of the access road;
- Cost contingency (20%).

The estimate is based upon preliminary engineering, quantity take-offs, tendered price quotations for vendor supplied components and budget price tendered quotations for major equipment and bulk commodities. Unit rates for installation are based on market enquiries specific to the Project and benchmarked to those achieved on similar projects undertaken recently within the Australian context.

The capital costs associated with the gas supply facilities and the gas-fired power station are not included in the estimate as these are both to be provided under a Build-Own-Operate (BOO) style contract and are captured in the gas supply and power unit cost used in the operating cost estimates.

Approximately half of the capital costs are directly exposed to possible foreign exchange variation.

The project execution strategy assumes a 12-month process for off-site construction, on-site construction and commissioning, and orders on long lead items to be placed shortly after the first product sales.

# 19.4. Sustaining Capital Cost

The sustaining capital expenditure estimate represents the cost necessary to sustain or maintain the capital assets to perform to the Project design criteria through the LOM. The PFS assumes these will be 1% per year of the relevant initial capital costs.

# 20. Operating Costs

Operating costs can be subdivided into mining, processing, site general & administration (G&A), shipping, and refining. Additional costs are royalties and the overhead costs of marketing, corporate overheads, and ore depletion reserve replacement. Table 10 provides a summary of all operating costs by key area for the operation.

**Table 10 – Operating Cost Summary (LOM)** 

Area	LOM A\$M	A\$ / t ore mined	A\$ / t product sold
Mining	213	17	36
Site Processing	196	15	33
Administration	49	4	8
Total Site Costs	458	36	77
Shipping	762	60	129
Refining	681	54	116
Marketing	26	2	4
Corporate Overheads	26	2	4
Reserve Replacement	6	1	1
Royalties	118	9	20
Sustaining Capital	15	1	3
Total (AISC)	2,092	165	354

*Note: All \$/t on an equivalent contained dry tonnes basis* 

#### **20.1.** Mine Operating Costs

The PFS cost model assumes an earthmoving contract with a mining contractor, including excavation and minor blasting costs, based on estimated prices from several reputable mining contractors. Allowances have been made for grade control drilling and assaying, pit dewatering, site rehabilitation and supervisory staff. The mining support equipment is planned to include a highway legal water truck and grader to maintain the gravel sections of the access roads in a dust free condition until the roads are sealed.

Grade control costs of A\$1.00 / dry tonne mined have been assumed.

Progressive rehabilitation of A\$150,000 per year is provided for, along with an allowance of A\$5M at the end of mine life for final rehabilitation.

#### 20.2. Processing and Administration Operating Costs

#### **Site Processing**

An operating cost estimate for the wet-processing plant was estimated by CDE Global and Andromeda staff as part of the plant design costing study. Common site overheads as General and Administration (G&A) costs have been also been included.

#### **General**

The operating cost estimate was developed for the Project and is presented in A\$ based on prices at Q2 2020. The estimate has an accuracy of +/-25% and was developed by CDE Global, and Andromeda staff using inputs sourced from local suppliers, similar projects, and in-house databases where appropriate.

The estimate includes costs for:

- Processing labour;
- Power;
- Dryer gas;
- Water consumption;
- Processing chemicals (flocculants);
- Diesel consumption;
- Process maintenance;
- Mobile vehicles for the process operations;
- Other direct general and administrative costs relative to the process plant and nonprocessing infrastructure.

Power costs are based on industry standard rates, and gas and water costs are based on quoted budget prices.

#### 20.3. Product Transport Costs

An allowance for transport by road from the mine to the port has been made based on the costs for land transport, port storage and ship loading contained in a study carried out by Qube Bulk.

There are several suitable port of export options which are available, with a final decision to made during the DFS phase.

# 20.4. Shipping Costs

In Q1 2020 budget pricing was obtained from Asiaworld Shipping Services for break bulk shipping of DSO raw material and wet-processed filter cake from a range of regional ports to Asian ports. A representative midpoint of these costs has been adopted for the PFS.

The shipping costs include Andromeda's own anticipated supervisory and coordination costs.

#### 20.5. Refinery Operating Costs

Land freight costs from overseas ports to the refineries have been allowed for, and the toll treatment wet-refinery cost estimates are based on budget purpose quotes received from large and small wet-refining plants in China and Japan. A tonnage capacity weighted-average of these proposals was used as the cost basis in the PFS.

The cost of water washing to remove salt, product quality upgrading, bentonite clay for plastic property modification, and product packaging in either 20kg paper bags or 1000kg FIBC bulk bags is included in the refining cost.

#### 20.6. Other Costs

A South Australian State government royalty of 3.5% on net sales (after reducing for shipping costs) has been incorporated in the financial model.

Corporate overhead and head office costs have been allowed for by an annual charge of A\$1M.

Marketing and sales support costs have also been provided for by an annual cost of A\$1M.

Reserve replacement is covered by a provision of A\$0.50/t of ore mined for drilling and geology services to replace depleted reserves by resource extensions of the original pits, or by the development of new resources on the Company's exploration tenements in the Poochera District.

# 21. Financial Modelling and Evaluation

The operating costs highlight a conventional technology, low cost and high margin operation with LOM average "All In Sustaining Costs" (AISC) of \$354/tonne of refined premium kaolin. The AISC is applied to the Poochera Project to indicate the full cost of maintaining an enduring long-life business and includes the following costs: mining, processing, site administration, shipping, toll refining, marketing, sustaining capital, royalties, site rehabilitation, corporate overheads, and reserve replacement exploration.

At a price of \$700/dry tonne for premium refined kaolin, and using an 8% discount rate, the Project generates the outcomes shown in Table 1, including:

- a payback of 15 months after commencement of site activities
- pre-tax NPV of A\$736M and an IRR of 175%
- after-tax NPV of A\$511M and an IRR of 135%

# 21.1. Sensitivity Analysis

Under the assumed forecast revenues and costs presented above, the financial analysis completed as part of the PFS shows a strongly viable project.

The investment case was subjected to a sensitivity analysis on the Net Present Value (NPV) and Internal Rate of Return (IRR) against the key variable parameters of refined premium kaolin price, plant metallurgical recovery of kaolin clay, operating costs and capital costs. In the sensitivity analysis, the operating costs include all direct, indirect and overhead costs except royalties, and the capital costs include all initial, deferred and sustainable costs except working capital. Each parameter was estimated for a +25% to -25% variation on the base case assumption. Refer to Tables 11 and 12.

Table 11 - Sensitivity Analysis of after-tax NPV<sub>8%</sub> for ± 25% variation of parameters (\$M)

NPV Parameter	(Low/Med/High)	75%	87.5%	100%	112.5%	125%
Product Price (A\$/t)	(541-700-859)	240	376	511	646	781
Plant Recovery (%)	(67-90-95)	349	420	511	546	546
Operating Costs (\$/t product)	(248-332-414)	661	589	511	433	356
Capital Costs (A\$M)	(63-84-105)	528	519	511	503	494

Table 12 - Sensitivity Analysis of after-tax IRR for ± 25% variation of parameters (%)

IRR Parameter	(Low/Med/High)	75%	87.5%	100%	112.5%	125%
Product Price (A\$/t)	(541-700-859)	40	74	135	227	339
Plant Recovery (%)	(67-90-95)	114	125	135	139	139
Operating Costs (\$/t product)	(248-332-414)	326	216	135	85	56
Capital Costs (A\$M)	(63-84-105)	185	157	135	117	102

These relationships are illustrated graphically in the "spider charts" shown in Figure 11 for NPV and Figure 12 for IRR:

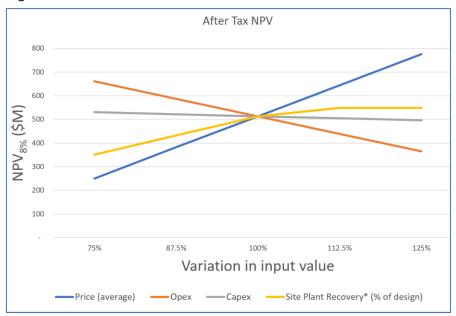


Figure 11 - Sensitivity Analysis of the after-tax NPV $_{8\%}$  for  $\pm$  25% variation of key parameters

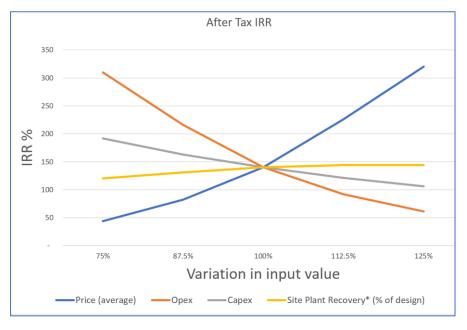


Figure 12 - Sensitivity Analysis of the after- tax IRR for ± 25% variation of key parameters

The sensitivity analysis shows that the Project is remarkably robust. The product price has the strongest influence, but an unlikely reduction in the product price of 25% still produces a positive NPV and strong IRR.

Processing recovery is the next strongest effect, but even a 25% reduction to what is for practical purposes an impossibly low recovery of Poochera kaolin still produces a viable project. The recovery NPV and IRR lines level off above 100% because it is not considered possible to significantly improve the base case of 90% site recovery.

The operating cost has a modest influence on the NPV.

The capital cost has a small effect on the NPV and indeed the Project NPV is practically immune to 25% changes in the capital cost.

# 22. Approvals

Based on the studies to date and the anticipated project impacts, it is expected the main environmental approval will be via a Mining Proposal submitted to the Department for Energy and Mining.

# 23. Planned Activity

As a result of the COVID-19 pandemic, ongoing interruptions and delays are anticipated over the remainder of 2020, and importantly, key meetings planned with some vital external stakeholders have been delayed.

The work program is now to advance the DFS and complete baseline and impact assessment studies in addition to preparing the mining proposal lease application.

The project schedule and approvals timeline is currently being carefully reviewed and includes the following activities:

- Land access negotiations with private, local and state government landowners;
- Targeted follow-up flora and fauna studies;
- Ground water investigation well construction and follow-up hydrogeology report;
- Road traffic studies;
- Noise and dust modelling and impact assessment;
- Soil rehabilitation study;
- European and Aboriginal cultural heritage surveys;
- Ongoing environmental baseline monitoring;
- Preparing necessary application documents for regulatory approvals and licences;
- Ore reserve estimation;
- Further mineral resource updating;
- Geotechnical follow-up and slope optimisation modelling;
- Final open pit optimisation and mine design fine tuning;
- Mining equipment and cost discussions;
- Further pilot scale testwork for advanced processing plant design;
- Processing Plant advanced design and tendering;
- Services (power, water, communications) supply optimisation;
- Detailed evaluation of port and product transport options;
- Formalisation of binding offtake agreements with customers;
- Complete DFS.

The anticipated timeline for the Project development is to conduct the environmental impact assessments over the balance of the 2020 calendar year and prepare a mining proposal application which is targeted to be lodged in early 2021. Subject to satisfactory progress negotiating agreements with key stakeholders, obtaining all necessary regulatory approvals and completion of the DFS, commencement of site activities is now targeted for early 2022.

Allowing for time required for site establishment and mine pre-stripping, mining, shipping, refining and product delivery, the first sales of Poochera halloysite-kaolin product is therefore estimated for mid 2022.

Known impacts of the COVID-19 pandemic has been factored into the timeframe targets, but further impacts are still unknown and may affect global and business access and therefore potentially influence these targets.

# 24. Project Funding

To achieve the range of outcomes indicated in the PFS, funding of approximately A\$28M is expected be required for capital works (including contingency), pre-production operating costs, and working capital. It is anticipated that most of the required finance will be sourced through a combination of equity and debt instruments from existing shareholders, new equity investment and debt providers from Australia and overseas. In addition, the Company has received signed Letters of Intent from a number of potentially large Chinese customers that may enable Andromeda to negotiate early receipt of sale proceeds, while also there are currently on issue approximately 650 million listed options (ASX: ADNOB) having an exercise price of 1.2 cents and expiry date of 30 November 2020 which are significantly "in the money" and would provide the Company with funds in the order of A\$7.8 million should they all be exercised prior to the expiry date.

The Company has enough cash on hand at the date of this announcement to undertake the next stages of planned work surveys, studies, and applications.

Andromeda believes that there is a reasonable basis to assume that funding will be available to complete all feasibility studies and finance the pre-production activities necessary to commence production and product sales on the following basis:

- The Board and executive team of Andromeda have a strong financing track record in developing resources projects;
- The Company has a proven ability to attract new capital;
- The Board believes the PFS demonstrates the Project's strong potential to deliver favourable economic returns; and
- Other companies at a similar stage in development have been able to raise similar amounts of capital in recent capital raisings.

# 25. Material Assumptions

Material assumptions used in the PFS which determined the Production Target and financial outcomes presented in this announcement are summarised below:

Criteria	Commentary
	The Mineral Resource estimate dated 23 December 2019 was used for the Study, which was prepared by a Competent Person in accordance with the requirements of the 2012 JORC Code as noted in the Compliance Statement in section 26 below.

Criteria	Commentary
Site visits	The site has been visited by the PFS Author, the Resources Competent Person, and at least one of the authors of each of the following contributing technical reports: Hydrology and Hydrogeology, Geotechnical, Flora and Fauna, and Mining
Study status	This announcement is based upon the May 2020 Prefeasibility Study.
	Financial modelling completed as part of the PFS shows that the Project is economically viable under current assumptions.
	Modifying Factors (mining, processing, infrastructure, environmental, legal, social and commercial) have been considered in the PFS.
Cut-off parameters	A mining breakeven cut-off grade (%-45µm) was estimated but found to be below the grade of the lowest block in the resource model, and so a cut-off grade was not required to be applied. All kaolinised granite contained within the pit design is scheduled to be mined and processed. The pit design was done with reference to contained kaolin clay classed as bright white and with a halloysite/kaolinite ratio above 10%, and focusing on measured and indicated resources, but including inferred resources where required to achieve a practical mine design.
Mining factors or assumptions	To ensure there is no contamination of the kaolinised granite, a 10% mining ore loss factor and 0% mining dilution is assumed.
	Pit optimisations were done and based on the selected optimised pit shell, a detailed manual and interactive pit design was completed.
	Detailed staged pit designs were done with due consideration of geotechnical, geometric, and access constraints. These pit designs were used as the basis for production scheduling and economic evaluation.
	Conventional mining methods (bulldozer and scrapers, and 6WD articulated dump trucks and excavator and supporting equipment), and costs were used in the Study.  The geotechnical parameters applied in the pit deigns were compliant with those
	suggested in the 2020 geotechnical study.
	Inferred Mineral Resources are included in the estimation of the Production Target but comprise only a minor (1%) part of it. The PFS Mine Plan is based on a Production Target of the following LOM quantities:
	Measured: 11.2Mt of the 15.6Mt in Mineral Resources
	Indicated: 1.3Mt of the 4.9Mt in Mineral Resources
	Inferred : 0.2Mt of the 5.5Mt in Mineral Resources
	Total: 12.7Mt of the 26.0Mt in Mineral Resources
	The Mineral Resources, published on 23 December 2019, underpin the Production Target.
Metallurgical and mineral processing factors or assumptions	Site based wet-process concentration and high specification wet refining are considered in the PFS. These processes have been successfully tested multiple times at both laboratory and pilot scale, and the techniques are widely and routinely used at full plant scale in the kaolin industry.
	Representative samples of mineralisation types suited to the processing approaches above have been obtained by RC or air core drilling and tested in kaolin processing laboratories and by bulk auger drilling and testing in pilot plants. Bulk auger drilling was focussed at an accessible portion of the orebody and further drilling and testing is required to assess the variability of the metallurgical properties across the extent of the proposed open pit.
	Metallurgical parameters applied to the resource model were:
	<ul> <li>DSO by wet refining: 95% metallurgical recovery of the contained kaolin clay;</li> <li>Site wet processed then refined: 88% metallurgical recovery of the contained kaolin clay.</li> </ul>

Criteria	Commentary		
	Steady site-plant throughputs of 500ktpa dry feed basis are assumed after the prestripping phase for the LOM.		
Environmental	All environmental, heritage and tenure approvals required under State and Commonwealth legislation are being progressed.		
Infrastructure	The mine site is readily accessible from Adelaide by multiple sealed highways and local gravel roads. The majority of the workforce will be sourced from the local region and reside within driving distance of the project site. Infrastructure is plentiful and readily available in the region.  The mine development will be on private land to be acquired by the Company. Appropriate power and water supplies have been identified and costed.		
Capital Costs	Capital estimates have been based on quoted budget prices or known factors and industry standard unit costs provided predominantly by specialist suppliers as well as current knowledge and industry experience where applicable.		
Operating Costs	Mining costs are based on industry standard unit rates and checked by contractor budget prices. Processing operating cost estimates were provided by CDE Global and from vendor budget quotes, and first principles. Transport and shipping costs are based on quoted budget prices.  Power costs are based on industry standard rates, and gas and water costs are based on quoted budget prices from China and Japan.  Toll basis wet refining charges used in the Study are based on budget purpose quotes. The SA Government retains a 3.5% net royalty on product sales, less shipping costs, and this is accounted for in the PFS financial assessment.		
Deleterious elements	Deleterious elements and product characteristics were assessed in the assay process, and subgrade materials were largely excluded from the mineral resource. Where minor amounts of such materials are encountered, selective mining is used to eliminate them or they are blended with above average quality materials to maintain the product specification.		
Currency and Exchange rates	Cost estimates are made in May 2020 Australian dollars, using the following assumed exchange rates where applicable:  United States of America Dollars  Chinese Yuan  USD: AUD = 0.70  CNY: AUD = 4.80		
Revenue factors	The mined processing plant feed head grades (as kaolin clay content expressed as %-45µm in the kaolinised granite) are estimated utilising industry accepted geostatistical techniques with the application of relevant modifying Factors.  The halloysite-kaolin price assumed for LOM operations on an ex-refinery dry product packaged basis is USD500/t (A\$700/t at USD:AUD=0.70) for the premium specification wet-refined kaolin product based on expert advice and discussions with potential customers, with Chinese Renminbi/Yuan (CNY) or USD conversions to AUD.		
Market assessment	Whilst the international market for kaolin is based on individual supplier vendor negotiations, Andromeda staff and its industry specialist advisors have a good understanding of market volumes and prices and this information has been used in the PFS.		
Economic	A financial model of the Project has been prepared by Andromeda using input factors as outlined above.  The model shows the Project is comfortably economically viable with a low initial capex, short payback, high NPV and high IRR. A discount rate of 8% has been used in the NPV analysis, and the inflation rate has been assumed at 0%, with fixed costs and product prices through the LOM.		

Criteria	Commentary
	Sensitivity of the Project to changes in the key drivers of sales price, operating cost (mining and processing cost) was carried out and showed the Project NPV to be most sensitive to significant changes in sales price.  The Study uses both a Pre-tax and After-tax basis, and a 100% Project basis for the financial assessment.
	financial assessment.
Social	Andromeda is negotiating a range of commitments with private landowners for land access.  Further negotiation is required with the affected landowners, as well as regulatory approvals from the Shire Council and state authorities to enable operations.  The Company has been involved with the site for more than 2 years and engaged with key local community stakeholders over that period. Positive working relationships have been established with directly affected landowners, the District Council of Streaky Bay and the Wirangu Native Title Claimant Group.
Naturally Occurring Risks	Thus far, there are no identified material naturally occurring risks affecting the Project.
Other	This PFS has confined itself to determining the economic viability of developing the Project, and its potential material impacts on the environment and community. The Company holds current Exploration Leases over the resource and surrounding areas. Access to the site is subject to the approval of the immediate landowners, and an agreement with them is required to enable approval of the Project and grant of the mining lease to enable operations of the Project to proceed.  Arranging finance to develop the Project is required and would occur after completion of the DFS, along with tendering for suitable contractors to carry out the mining and to construct the process plant and infrastructure.  A range of governmental agreements and licences are required prior to the decision to commence construction can be made, in particular the Mining Proposal and Mining Lease Application.  It is expected all necessary approvals and licences will be forthcoming when applied for progressively over the ensuing phases of the Project.  The impact of the COVID-19 pandemic is not considered material to the product pricing because sales are scheduled to extend for 26 years from 2022.
Classification	The underlying Mineral Resource classification consists of Measured, Indicated and Inferred Mineral Resources, but inferred resources comprise only a minor part (1%) of the Production Target.  Ore reserves have not been estimated to date and are planned to be compiled after completion of the PFS.
Audits or reviews	The various elements of the contributing reports have been internally reviewed, but no external audits or independent peer reviews have been done.
Study Accuracy	The estimates in this Study are based on a ±25% level of accuracy in technical studies and costings. A contingency of 20% is included in all capital costs.

# 26. Competent Person's Statement – Mineral Resources

The data in this announcement that relates to the Mineral Resource Estimates for the Poochera Kaolin Project is based on information in the Resource announcement of 23 December 2019 titled "Significant increase in Mineral Resource for the Poochera Kaolin Project", and available to view on the Andromeda website.

For the purposes of the PFS study, the Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and, in the case of estimates of Mineral Resources, that all material assumptions and technical parameters underpinning the estimates in the original market announcement continue to apply and have not materially changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcement.

# 27. Forward Looking Statements

Some of the statements contained in this announcement 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 announcement, and on other published information of Andromeda, the words such as "will", "planned", "expected", "projected", "estimated", "may", "scheduled", "intends", "anticipates", "believes", "potential", "nominal", "conceptual" 'aim', 'could', 'intend', '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, financial markets and other risks not anticipated by Andromeda.

Andromeda is pleased to report this summary of the PFS 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.

#### **Footnotes**

- 1. After-tax, 100% Project basis, Q2 2020 Australian Dollars (A\$), 8% discount rate, 0% debt finance
- 2. All In Sustaining Costs (AISC) include mining, processing, site admin, shipping, offshore refining, marketing, sustaining capital, royalties, site rehabilitation, corporate overheads and reserve replacement exploration costs
- 3. Price for premium grade wet-refined bright while halloysite-kaolin for ceramics, ex works
- 4. The Production Target is sourced from mainly Measured (89%) and Indicated Resources (10%), with only a very minor amount (1%) from Inferred Resources
- 5. Resource announced 23 December 2019 titled "Significant increase in Mineral Resource for the Poochera Kaolin Project"