

BACKGROUND DESK NOTE / NO RESEARCH RECOMMENDATION OR VALUATION INCLUDED

COMPANY	Andromeda (ADN)	
MARKET CAPITALISATION	~A\$165m	\$0.05 /share
RECOMMENDATION	Not Covered	
EVENT	PAC Partners - BRIEFING NOTE	

KEY POINTS: Time for a fresh look at Andromeda

Andromeda's share price has descended from highs just as the company is resetting with:

- ♦ **new management**
- ♦ **incoming, a refreshed board,**
- ♦ **a resized to be more executable Great White Kaolin-Halloysite**
- ♦ **Project, newly signed customer offtake agreements, and**
- ♦ **a Final Investment Decision due mid-year.**

The project plan for the Great White kaolin-halloysite Project has been **right sized to make it a more executable project** for Andromeda and the likely financial resources it can bring to the project.

In January, the company announced that **Rob Katsioularis would relocate from Europe** and replace James Marsh as MD (James shifting to a Sales/Marketing role). Rob has a particular experience in commercial aspects of industrial minerals operations gained through his experience at multinationals Imreys, Rio Tinto and Rusal, with a particular focus on **“mine to market”** – that is ensuring mine development and output is matched to customer demand.

In our view, as...

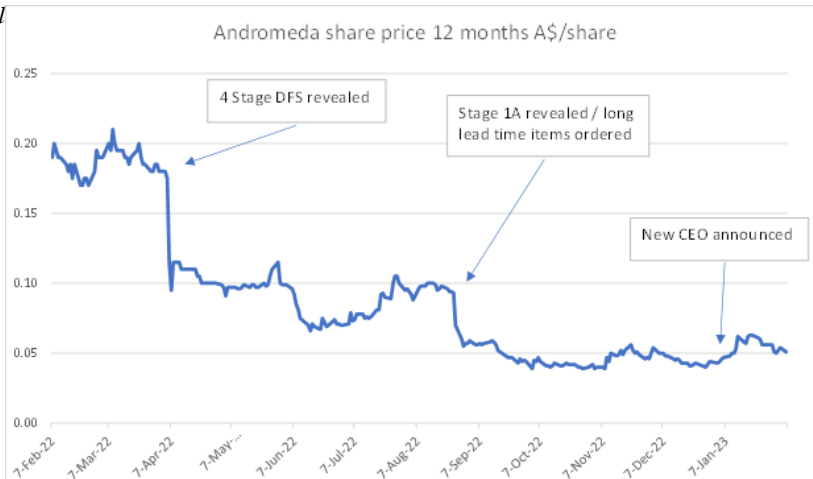
- ♦ **New management takes the reigns (April),**
- ♦ **Environmental approval is granted (in coming months),**
- ♦ **and Funding locked in (by mid-year)**

...we think investors will be prompted to take another look at Andromeda.

KEY RISKS

- ♦ **Funding:** Capital required for Stage 1A is in the range \$50-60m, significant for the company of ~\$165m market capitalisation. Based on a 60/40 split, it would suggest \$35m debt and \$25m equity on our estimates needs to be raised by Andromeda, failing this, it would put project development at risk.
- ♦ **Project Delivery:** Once a final investment decision has been taken, it is ~9 months to first production. Andromeda will need to manage the typical risks associated with project delivery including cost overruns, ramp up and scaling up from a pilot process plant.
- ♦ **HMBP v RBL:** Highest Margin Business Plan versus Realisable Business Plan: Much of the focus in recent years has been on the higher or highest possible margin halloysite products and a full-scale development of the Great White project. However, the “Starter Plant” and Stage 1 are the key focus now as Andromeda seeks to get into production and grow from there. This may deter some investors who have been attracted by the full scale development potential of the Great White Project.
- ♦ **Kaolin pricing:** Disruptions and price surcharges in Europe (Ukraine ~10% of global supply / European energy surcharges) have resulted in higher kaolin pricing globally. However these factors may reverse.

Figure 1: Share price appears to be now factoring in a realistic Great White Project



Source: IRESS

BACKGROUND: Andromeda (ADN) | Mcap \$165m (share price \$0.05)

What is kaolin, and halloysite-kaolin?

- ♦ **Kaolin** is a bright white inert mineral with very fine particle size. It has been used in ceramics for centuries (e.g. China) and is also used in cosmetics, paint, rubber, medicines, paper, plastics and other uses. It is best thought of as an industrial mineral associated with chemical industry (more opaque pricing) rather than a global mined commodity such as copper (uniform pricing).
- ♦ **Halloysite** is a rare form of kaolin which occurs as microscopic tubes imperceptible to the human eye. This gives it an enormous surface area (1 gram of halloysite-kaolin can have ~1.6km of surface area). This makes halloysite suited to a diverse range of specialist applications and a premium price (>10x kaolin grade prices).

Figure 2: Product possibilities: From kaolin concentrate to specialist halloysite

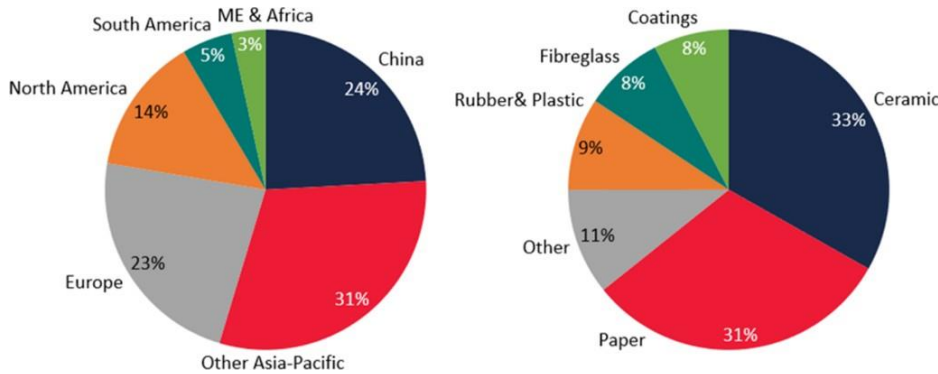


Source: Andromeda ASX release

Global kaolin market – strong demand growth

- ♦ 40Mt/yr total global market or ~US\$9bn/yr.
- ♦ End markets are traditionally ceramics and paper, but these exhibit low or declining margins.
- ♦ Emerging markets of **green cement** and other specialty chemical uses offer significantly higher margins.
- ♦ Demand expected to grow 11%/yr across Asia Pacific region (CAGR) per TZMI.

Figure 3: Kaolin market summary

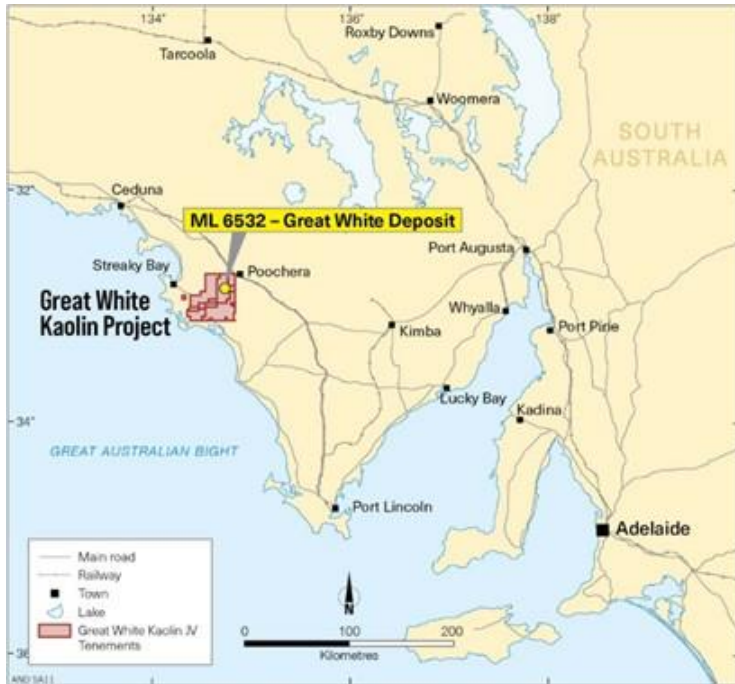


Source: Andromeda ASX release (& TZMI for Andromeda)

Andromeda's Great White deposit - Significant potential in the global market due to quality and size

- ♦ Andromeda owns **100% of the Great White** and Hammerhead kaolin-halloysite deposits in the **Eye Peninsula in South Australia**.
- ♦ The Great White kaolin-halloysite Deposit is of **superior quality** in terms of brightness of colour (ISO 80+) and low level of impurities (such as iron Fe).
- ♦ It is also the **world's largest reserve** of halloysite-kaolin.
- ♦ Andromeda is not an exploration play, Great White has a **JORC defined resource** and a reserve supporting 28-years of mine life.

Figure 4: Location of Great White Project in South Australia



Source: Andromeda ASX release

Project Development – Has Been “Right Sized”

- ♦ The Great White Project was to be developed in a 4 stage process for capex of \$220m.
- ♦ However, project development has now been **broken down further into more realisable steps**.
- ♦ This will give it a closer “mine to market” strategy (i.e. deliver into already agreed offtakes) and tightly manage risks including funding and cost overruns.
- ♦ **Stage 1 is the near term focus** of the company and this has been broken down into Stage 1A and Stage 1B.

Stage 1A:

- ♦ **Capex \$50-60m** for a “Starter Sized” Processing Plant and initial infrastructure (roads, water, power) – that will benefit latter stages.
- ♦ 100kt/yr ore throughput for **50kt/yr of final product** (KCM90 - for paints, and HRM – a concrete additive).

Stage 1B:

- ♦ Adds another 50kt/yr or 100kt/yr of final product capacity. Capex required range of \$20-\$40m (our estimate).
- ♦ The company has guided to around 9 months from Final Investment Decision to First Production.

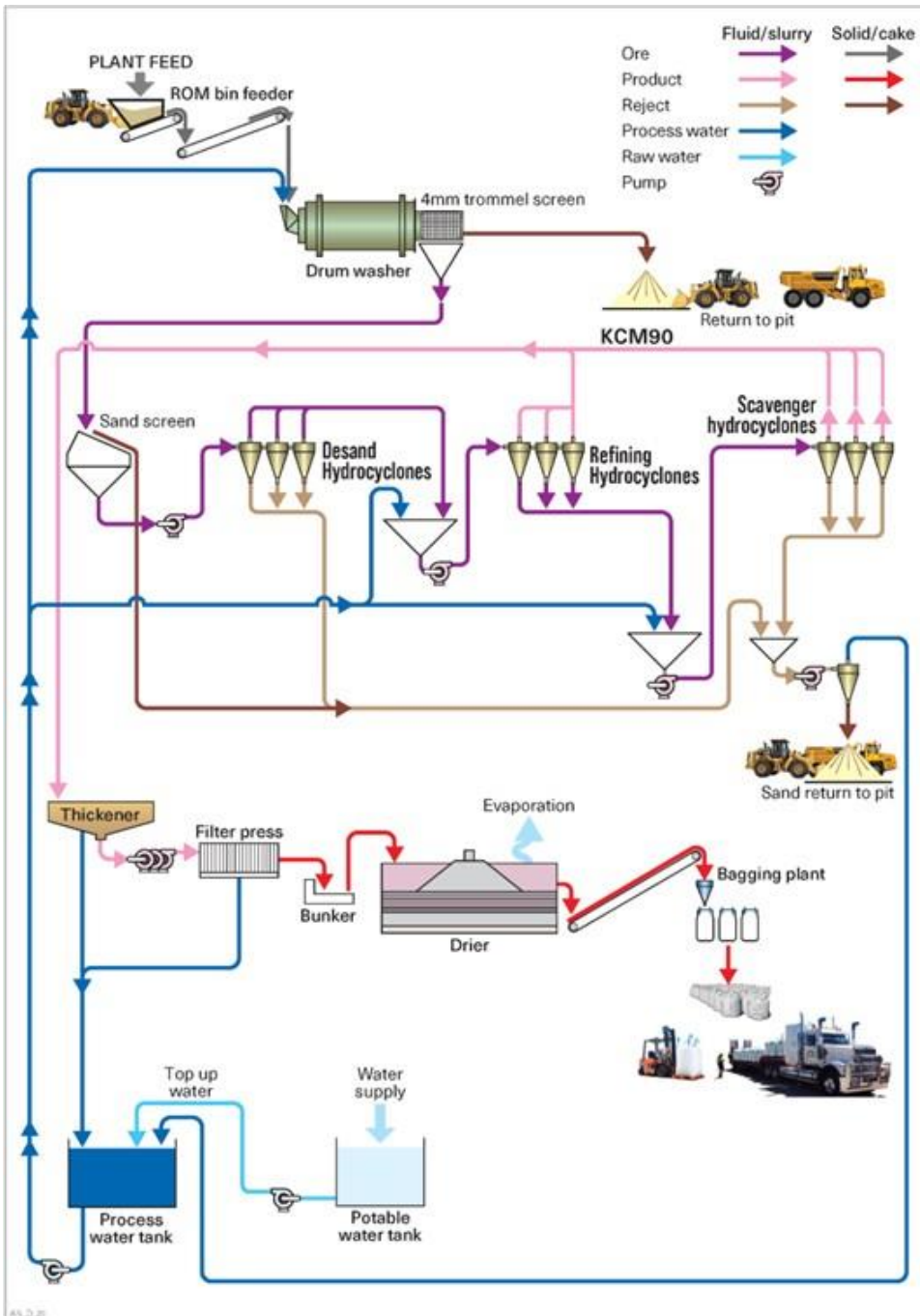
Mining Methods: Simple

- ♦ Low-cost simple mining methods (truck and shovel) with deposit relatively shallow and easy to access (located upon farmland).
- ♦ Mining lease granted and Native Title extinguished.
- ♦ Awaiting final environmental approval PERP (Program for Environment Protection and Rehabilitation from South Australia Department of Energy & Mining).

Processing: A series of hydrocyclones

- Processing is a wet operation that is essentially a series of hydrocyclones (as finer material is produced, more sets of hydrocyclones are required).
- It is generally a chemical free process (a non-toxic flocking agent is used).
- Tailings are sand returned to the mining pit.

Figure 5: Stage 1 Process Flow Sheet



Source: Andromeda ASX release

Pilot Plant – In Production

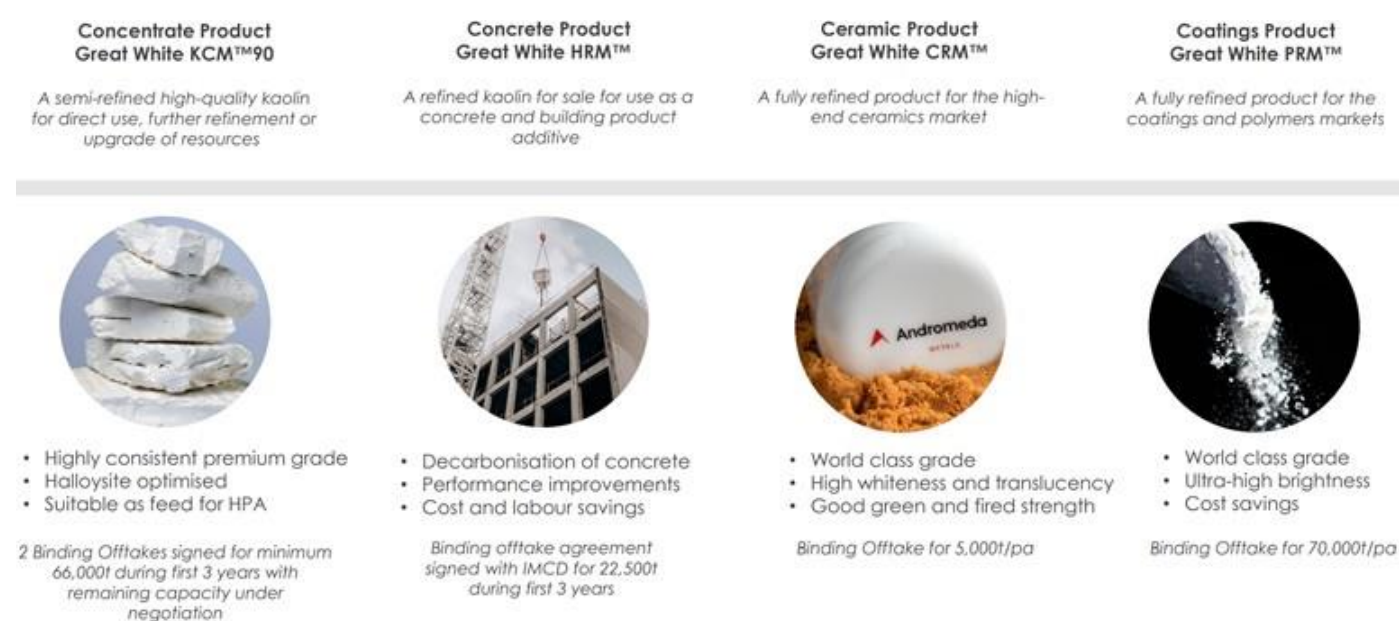
- An operating pilot plant is located on the South Australian coast at Streaky Bay, 77km from Great White Project.
- It produces end products in batch runs to support customer sampling, qualification, and offtake.
- The pilot plant matches the revised project process plant flow sheet with drum washer, hydro-cyclones, thickener and filter press.

Product Suite – DSO has been superseded

The Direct Shipping Ore Product suggested back in the prefeasibility stage has been superseded by a product suite of semi processed intermediate products:

1. KCM90 - for paints
2. **HRM - concrete additive**. Certified for use by Australian concrete standards. Drives not only decarbonisation of industry but also provides product performance and cost benefits. Large total addressable market / high margin product as some of the ore sand is retained within the product.
3. **SRM – chemical applications** (coatings, suspension aid, within lubricants)
4. CRM - for ceramics
5. PRM – for paints and coatings (a higher cost product, a later stage focus)

Figure 6: Product Suite



Source: Andromeda ASX release

Customer Offtakes – Underpinning Development of GW

The commerciality of the Great White Project Stage 1A is underpinned by a number of binding offtake agreements:

1. Nov-2022: with **IMCD Japan** (speciality chemicals company) for 22.5kt of HRM and SRM over 3 years (max 30kt / min 15kt).
2. August-2022: **Plantan Yamada Japan**, for 35kt over 3 years of KCM90 at prices superior to DFS (min 27kt and max 43kt).
3. July-2022: **AMR Vietnam and HK** for 31kt of KCM90 over 3 years, a superior pricing to DFS (min 23.5kt and max 35.8kt).

Over the first 3 years, these offtakes total min 66kt, baseline 88kt and max 109kt – against cumulative potential output for 150kt Stage 1A only. Other binding agreements are in place to support offtake for refined products during latter stages of development.

Product Pricing Strategy – A mix of Precedent, Market Price and Negotiation

Pricing assumptions were presented in the DFS and range from

- ♦ \$350 per tonne of concentrate,
- ♦ \$1,000-\$1,500 per tonne for the HRM concrete additive, and
- ♦ 90% and pure halloysite sells \$5,000 per tonne and significantly more per.

Peers: An emerging set of kaolin companies

There are an emerging set of kaolin and halloysite-kaolin peers listed on the ASX.

- **SUVO Strategic Minerals** (\$32m mcap) (long term operating kaolin project in Victoria plus development projects WA)
- **WA Kaolin** (\$61m mcap) (project in ramp up phase, dry separation process)
- **Latin Resources** (\$250m mcap including lithium) (has a development project in WA and steering it towards agriculture end use market as a feed additive for livestock to reduce methane emissions).

Only one kaolin project has been in operation for a long period of time (SUVO's Pittong) and given each deposit is unique and the uses of kaolin are varied, much effort is devoted by each company to define its specific end market and customer base.

Andromeda Capital Structure: Also reset

- Market cap **\$165m** with share price at **\$0.051c** (52 wk high \$0.21 low \$0.038)
- Shares on issue **3,110,008,432**
- Options **47,004,575** various strikes and maturities (**1.5%** of issued shares)
- **\$24m** cash end December following a spend of \$3.7m in Dec-Qtr
- Share register – overwhelmingly retail (14,200 shareholders)
- Largest holder ~5.2% (not an institution)
- Last capital raise: \$45m at 15c in July 2021 (\$15m share purchase plan + \$30m placement).

Catalysts: A Cascade of Catalysts in 1H 2023 as project development gets closer

- Q1 - Additional offtake agreements (HRM focused / sufficient offtakes already in place for development)
- Q1 - Debt funding initial agreements
- Q1 - Environmental approval to proceed (PEPR - South Australia Department of Energy & Mining).
- Q1 - March investor site tour (eyes on the stock)
- Q2 - Equity funding as required
- Mid 2023 - Final Investment Decision (~9 months FID to production)
- By Mid-2024 - 1st Production from Stage 1A (50ky/yr) and possible move to develop Stage 1B (150kt/yr) to be considered.

Directors - Refreshed

- **Rob Katsioularis** (incoming): MD and CEO. Greek Canadian citizen who is relocating to Adelaide who has worked at Imerys, Rio Tinto (10 years, industrial minerals), and most recently in Europe with Nystar, Vale and Rusal. Rob's focus has been commercial operations emphasis on improving profitability from mine to market via implementing an industrial marketing model that adds value by balancing between mine to market, and market to mine.
- **James Marsh** (transitioning from MD) - Executive Director / Sales & Marketing (transitioning from MD into this role in April 2023). James was instrumental in identifying the uniqueness of the Great White halloysite resource, and followed a long 34 year career of marketing kaolin and halloysite globally across 51 countries.
- **Mick Wilkes** - Non-Executive Chair (April 2022)
- **Melissa Holzberger** - Non-Executive Director (Sept 2021)
- **Austen Perrin** - Non-Executive Director (June 2022)

Management - Refreshed

CEO/MD as per above. The company has also

- appointed new CFO (Michael Zannes) (June 2021),
- COO (Jo Ransford) (Oct 2022) (previously on board). Commercial Manager (Tim Anderson) (Nov 2021) and

Valuation scenarios

- Market cap **\$165m** with share price at **\$0.05c** (52 wk high 0.21 low \$0.038)
- Book value of equity: \$171m 30/6/22
- The 4 Stage full scale NPV from April 2022 was \$613m after \$220m of capex (however at this stage only Stage 1 is the focus)
- We expect more financial detail from the company as Stage 1A approaches.

Figure 7: Fully Developed Project Economics (4 Stages)

Parameter		Life of mine (Total)
Plant feed (nominal)	Dry metric tonnes (dmt)	300,000 (years 1-5) 600,000 (years 6-28)
Production	Great White HRM™ (dmt)	260,000
	Great White KCM™90 (dmt)	246,000
	Great White PRM™ (dmt)	336,000
	Great White CRM™ (dmt)	6,400,000
Weighted average product sale price (AUD/dmt)		653
Life of mine (years)		28
Strip ratio		2.3
Start-up capital (AUD million)		93.8
Sustaining capital (AUD million)		26.0
Revenue (AUD million)		4,706
EBITDA ¹ (AUD million)		2,283
Pre-tax cashflow (AUD million)		2,050
NPV (before tax) (AUD million)		613
IRR (% before tax)		36
Payback period (stages 1 – 3 in years) ²		5.9

¹ Earnings Before Interest, Taxes, Depreciation, and Amortization

² Includes payback of initial AUD 93.8 million as well as the further plant upgrades within that time

Source: Andromeda ASX release

RESERVES AND RESOURCES

Ore Feed Category	Reserve Category	Tonnes	Yield		Halloysite	Brightness (R457)	Fe2O3
			Great White PRM™	Great White CRM™			
			(Mt)	(% of whole rock)			
Great White PRM™ Feed	Proved	0.4	27	18	3	87	0.3
	Probable	1.1	24	16	1	87	0.3
	Subtotal	1.5	25	17	2	87	0.3
Great White CRM™ Feed (Great White KCM™90 & Great White HRM™)	Proved	4.8	-	45	15	84	0.5
	Probable	8.9	-	46	11	83	0.5
	Subtotal	13.7	-	46	12	83	0.5
Total		15.1 ³	-	-	-	84	0.5

Great White KCM™90/HRM™ are products of the CRM feed and process with minor changes in processing methodology.

JORC Resource Reference Tables 1

	Measured Resource				Indicated Resource				Inferred Resource				Total Resources			
	Tonnes	PSD	Kaolinite	Halloysite	Tonnes	PSD	Kaolinite	Halloysite	Tonnes	PSD	Kaolinite	Halloysite	Tonnes	PSD	Kaolinite	Halloysite
	(Mt)	<45µm	(%)	(%)	(Mt)	<45µm	(%)	(%)	(Mt)	<45µm	(%)	(%)	(Mt)	<45µm	(%)	(%)
Great White ^{1,2,3}	5.7	50.2	39.5	6.9	14.2	51.1	42.0	5.0	14.7	49.3	40.3	4.9	34.6	50.2	40.9	5.3
Hammerhead ^{1,3,4}									51.5	52.6	42.7	6.5	51.5	52.6	42.7	6.5
Mount Hope ^{1,3,5}									18	41.5	33.8	1.4	18	41.5	33.8	1.4
Total ¹	5.7	50.2	39.5	6.9	14.2	51.1	42.0	5.0	84.2	49.7	40.4	5.1	104.1	49.9	40.6	5.2

1. Figures are rounded to reflect appropriate levels of confidence. Apparent differences may occur due to rounding.

2. ASX 28 November 2020, Updated mineral resource for the Great White Kaolin JV Deposit

3. ISO brightness (R457) cut-off of at 75 in the <45µm size fraction

4. ASX 29 September 2020, New mineral resource estimate for Hammerhead Halloysite-Kaolin Deposit

5. ASX 11 August 2020, New mineral resource for the Mount Hope Kaolin Project

Source: Andromeda ASX release

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PAC Partners Investment View is based on an absolute 1-year total return equal to capital appreciation plus yield.

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	Buy	Hold	Sell
	>20%	20% – 5%	<5%

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