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HPA FIRST PROJECT STAGE 2 COMPELLING DEFINITIVE FEASIBILITY STUDY UNDERPINS FINAL INVESTMENT DECISION AND EQUITY RAISING

HIGHLIGHTS

DEFINITIVE FEASIBILITY STUDY

- Definitive Feasibility Study concluded, highlighting compelling project economics
 - Annual Stage 2 production capacity of 10,430t with optimised product mix
 - Annual, steady-state, revenue of A\$359M A\$509M
 - Annual, steady state, EBITDA of A\$255M A\$403M
 - Highly competitive unit cash costs of A\$9.58/kg (US\$6.70/kg)
 - Updated CapEx of A\$553M, which includes A\$79m contingency

FINAL INVESTMENT DECISION

- Final Investment Decision taken on HPA First Project Stage 2
- Project execution to commence immediately, with first production targeted for 1H FY27

PROJECT FINANCING

- Credit approved A\$320M facility (plus A\$80M cost overrun) secured from NAIF and EFA
- Fully underwritten institutional placement of A\$120M (before costs)
- Non-underwritten share purchase plan
- Government grants totalling A\$66.7M

ESTABLISHING A GLOBAL LEADING SUPPLIER TO HIGH TECHNOLOGY GROWTH SECTORS

• HPA First Project Stage 2 and the downstream Alpha Sapphire business establishes the Company as a leading supplier of high-performance, specialty materials to global technology markets including the semiconductor, lithium-ion and LED lighting sectors

Alpha HPA Limited (**Alpha** or **the Company**) (ASX: A4N) is pleased to announce that it has taken a Final Investment Decision (**FID**) in respect of Stage 2 of the HPA First Project (**Stage 2**), supported by compelling Definitive Feasibility Study (**DFS**) outcomes and credit approval for A\$320 million in project debt and an A\$80 million cost overrun facility from Government agencies, the Northern Australia Infrastructure Facility (**NAIF**) and Export Finance Australia (**EFA**), as announced to the ASX on 17 April 2024.

Alpha will immediately commence project execution for Stage 2 having advanced a number of key elements of the Stage 2 project implementation, with construction to commence mid CY2024 on the existing HPA First Project site at Yarwun, near Gladstone, Queensland.

The Stage 2 DFS and FID build upon:

- an extensive 4+ year product marketing campaign to over 200 end-users and parallel product development effort, to maximise Alpha's process capability and margins to service the highest demand growth markets;
- the successful construction, commissioning and 16+ months of operation of Stage 1 of the HPA First Project; and
- a comprehensive re-design and re-engineering (since 2020) of the Stage 2 facility to capture process refinements, expanded product range capability as well as key customer requirements.

Pleasingly, these outcomes have supported the financing of Stage 2 on attractive terms consisting of:

- A\$320 million in project debt and an A\$80 million cost overrun facility from Government agencies, the NAIF and EFA; and
- A\$120 million fully underwritten institutional placement and non-underwritten Share Purchase Plan¹.

The government debt facilities, government grants and equity raising are part of a broader funding package Alpha is progressing to fully fund the HPA First Project Stage 2. In addition to the government debt and equity, Alpha has received non-solicited approaches for the provision of alternative and non-dilutive financing arrangements from a number of parties. These include advanced proposals for alternative financing to fund any further Stage 2 capital requirements.

On completion of the equity raising, Alpha will immediately commence Stage 2 project execution and deliver on the Stage 2 construction timeline.

In parallel, Alpha continues to advance its complementary downstream Alpha Sapphire business, completing installation of the initial 2 sapphire growth units and completing first sapphire crystal growth.

Alpha's Managing Director, Rimas Kairaitis said, "This decision to proceed with the commercialisation of Stage 2 of the HPA First Project and the successful project financing represents a major step-change in our business growth. We are delighted to have received comprehensive financing support from the Australian Government and from new and existing shareholders. The feasibility study and financing represent a comprehensive endorsement of the Company's technology and business strategy and allows for Alpha to establish Australia's first, large scale commercial capability to manufacture high purity aluminas and related products to support key high technology growth sectors and the global energy transition."

¹ Alpha may, in its absolute discretion, cap or apply a scale-back on the SPP.



3D Schematic of HPA First Project showing Stage 1 (as built) and Stage 2





HPA FIRST PROJECT STAGE 2 DFS AND PROJECT FINANCING

Alpha is pleased to present the findings of the Definitive Feasibility Study (**DFS**) for Stage 2 of the HPA First Project. This DFS represents a comprehensive update to the initial Project DFS delivered in March 2020, with a materially improved financial case.

This DFS represents the final, optimised financial HPA First Project investment case, enabling the Company to take its Final Investment Decision (**FID**) and commence construction of Stage 2 of the HPA First Project.

Stage 2 of the HPA First Project (**Stage 2**) represents the full commercial scale deployment of Alpha's proprietary aluminium purification and refining technology to produce a range of ultra-pure, high value aluminium-based materials for specialty, high technology markets including semiconductors, lithium-ion batteries (LiBs) and LED lighting.

DFS HIGHLIGHTS

- Expanded product offering focused on specialty, high value applications
- Annualised high purity aluminium product capacity of 10,430 tonnes per annum
- Annual EBITDA of between A\$255 A\$403M* (post royalties)
- Unit cash costs of A\$9,578/t (US\$6,705/t) per aluminium product after by-product credits
- Pre-production Project CapEx A\$553M (US\$387M) including A\$79m contingency
- Increased process and financial flexibility with addition of multiple aluminium based product capabilities
- Capability to expand aluminium nitrate production as market expands

*Between Alpha's Price Discovery Case and Independent Pricing Case

KEY FINANCIAL METRICS

The Stage 2 DFS shows the delivery of a technically robust and financially compelling business case, built on the ability of the Company's process to deliver a range of ultra-pure, high value aluminium materials at low cost.

Headline Stage 2 metrics include:

HPA First Project Stage 2					
Key Project Parameters	A\$	US\$			
FX AUD:USD	C).70			
Combined production all aluminium products (tpa)	10,430				
Annual Average Cash Operating Cost - after by-products credits ¹	\$100M	\$70M			
Unit Cash Cost (\$/t of aluminium product) - after by-products credits	\$9,578	\$6,705			
Annual aluminium feedstock processed (wmt)	13	,400			
Pre-Production Capital Cost (including A\$79m contingency)	\$553M	\$387M			

Note:

1. Operating estimate does not include any potential impact of the Budget measures relating to critical minerals tax credits delivered as part of the Federal Budget on Tuesday 14 May 2024.

The key operating financial metrics of the DFS are as follows, where steady state operations are defined as post ramp-up (note, these metrics do not include Alpha Sapphire).

	Product Pricing Scenari				
Key Project Metrics at Steady State ¹	Alpha HPA Price Discovery Case	Mid Case	Independent Pricing Case		
	A\$	A\$	A\$		
Annual Revenue @ 10,430tpa high purity Aluminium products	\$359M	\$442M	\$509M		
Annual Operating Costs (after by-product credits) ²	\$100M	\$100M	\$100M		
EBITDA (after Payroll Tax & Royalty) ³	\$255M	\$336M	\$403M		
Pre-Tax Free Cash Flows ⁴	\$251M	\$333M	\$399M		
Unit Cash Cost (A\$/kg of aluminium product after by-products credits)	\$9.58	\$9.58	\$9.58		
Weighted Average Product Sales Price (A\$/kg)	\$34.44	\$42.34	\$48.77		
	US\$	US\$	US\$		
Unit Cash Cost (US\$/kg of aluminium product after by-products credits)	\$6.70	\$6.70	\$6.70		
Weighted Average Product Sales Price (US\$/kg)	\$24.11	\$29.64	\$34.14		
Payback period from first production (years)	4.4	3.7	3.4		

HPA Equivalents	Alpha HPA Price Discovery Case	Mid Case	Independent Pricing Case
HPA Eq Volume (tpa)	6,850	6,850	6,850
HPA Eq. Sales Price (A\$/kg)	\$52.44	\$64.47	\$74.26

Note:

1. Steady state operations are defined as post-ramp-up (ie: from FY30 onwards) noting the Company expects to reach 23% by 2026, 87% by 2027 and 93% by 2028.

2. Operating estimate does not include any potential impact of the Budget measures relating to critical minerals tax credits delivered as part of the Federal Budget on Tuesday 14 May 2024.

3. EBITDA is after royalties and payroll tax.

4. Pre-Tax Free Cash Flows are after sustaining capital and working capital.

Where:

- Alpha HPA Price Discovery Case: A conservative case using volume weighted pricing confirmed by Alpha as valid historical in-market pricing, obtained through Alpha's own comprehensive market research and market outreach through sales, bids, offers and LOIs from 2022 to present. A detailed report on product price discovery was announced to the ASX on 8 May 2024.
- **Mid Case:** Using third-party consultant pricing for alumina-based products (CM Group) and aluminium nitrate pricing at more conservative levels than third-party than consultants (GLG). Alpha notes the close alignment between the CM Group market pricing and the upper end pricing observed within Alpha's own market engagement for a majority of Alpha's product lines.
- Independent Pricing Case: Using high purity aluminium product pricing based on third party consultants (CM Group and GLG).



PROJECT FINANCING

Loan Facilities

As announced to the ASX on 17 April 2024, Alpha has now received conditional approval for A\$320 million in Project Ioan facilities and an A\$80 million cost overrun facility in respect of Stage 2 of the HPA First Project. The facilities will be jointly funded by the following Australian Government financing agencies (**Lenders**):

- Northern Australia Infrastructure Facility (NAIF); and
- Export Finance Australia (**EFA**), with support provided under the Australian Government's A\$4 billion Critical Minerals Facility (administered by EFA) and EFA's Commercial Account.

The Australian Government agencies, NAIF and EFA, have each committed A\$160 million in construction facility funding for the project. The Australian Government's A\$4 billion Critical Minerals Facility supports the Australian Government's Critical Minerals Strategy 2023-2030 by providing finance to strategically significant projects.

A final commitment is subject to conditions required under the Critical Minerals Facility, completion of all due diligence to the satisfaction of EFA and NAIF, execution of finance documentation and satisfaction of customary conditions precedent. Drawdown is also subject to the Company securing letters of intent and product qualification for an aggregate of 10ktpa reasonably aligned with the intended product and production profile. An inability to meet these conditions may delay or prevent drawdown of the Project loan facilities.

Equity Financing

Alpha is conducting a fully underwritten placement of new fully paid ordinary shares in Alpha to eligible institutional investors to raise A\$120 million (before costs) (**Placement**). Funds from the Placement will be used to immediately commence Stage 2 project execution including finalising detailed engineering, ordering of long-lead items, commencing civil and construction works and for general working capital purposes.

Alongside the Placement, Alpha will undertake a non-underwritten Share Purchase Plan (SPP)².

The Placement is being conducted at A\$0.90/share ("**Placement Price**"), representing a 10.0% discount to last close of A\$1.00 on Friday, 17 May 2024.

Pre-commitments have been received from several of Alpha's existing major shareholders including Orica Limited.

The Placement will take place in two tranches:

- Tranche 1 to raise approximately A\$64 million via the issue of approximately 71 million new shares utilising the Company's placement capacity under ASX Listing Rule 7.1 (**Tranche 1**); and
- Tranche 2 to raise approximately A\$56 million via the issue of approximately 62 million new shares, subject to shareholder approval to be sought at an upcoming Extraordinary General Meeting (**EGM**) of the Company expected to be held on or around Monday 24 June (**Tranche 2**).

Details of the time and venue for the EGM will be provided in a notice of meeting, expected to be despatched to shareholders on or around Thursday, 23 May 2024.

New shares issued under the Placement will rank equally with existing fully paid ordinary shares in Alpha.

The Placement is fully underwritten with Bell Potter Securities Limited and Macquarie Capital (Australia) Limited acting as Joint Lead Managers and Underwriters.

Share Purchase Plan

The SPP will enable all eligible Alpha shareholders (including retail shareholders) with registered addresses in Australia and New Zealand at 7:00pm (AEST) on the Record Date of Friday, 17 May 2024 ("Eligible Shareholders") the opportunity to apply for New Shares at the lower of:

- The Placement Price; and
- A 2.0% discount to the 5-day VWAP of Alpha shares traded up to, and including, the closing date of the SPP (expected to be Thursday, 13 June 2024), rounded down to the nearest cent.

² Alpha may, in its absolute discretion, cap or apply a scale-back on the SPP.



The Eligible Shareholders will be offered the opportunity under the SPP to apply for up to \$30,000 worth of New Shares. Alpha may, in its absolute discretion, cap or apply a scale-back on the SPP.

Proceeds raised from the SPP will be used to immediately commence Stage 2 project execution.

New Shares issued under the SPP will rank equally with Alpha's existing shares. The terms and conditions of the SPP will be set out in a SPP Offer Booklet that will be released on ASX and provided to Eligible Shareholders in accordance with the timetable.

Indicative Timetable

Event	Date
Record Date for Eligibility to participate in SPP	7:00pm (AEST), Friday, 17 May 2024
Trading halt lodged and announcement of Placement	Monday, 20 May 2024
Announcement of completion of Placement and trading halt lifted	Tuesday, 21 May 2024
Settlement of Tranche 1 Placement Shares	Thursday, 23 May 2024
Despatch of Notice of Meeting	Thursday, 23 May 2024
Allotment and commencement of trading of Tranche 1 Placement Shares	Friday, 24 May 2024
Dispatch SPP offer documents and SPP Opening Date	Thursday, 28 May 2024
SPP Closing Date	Thursday, 13 June 2024
Announcement results of the SPP and allotment of New Shares issued under the SPP	Thursday, 20 June 2024
Shares issued under SPP commence trading	Friday, 21 June 2024
General Meeting to approve Tranche 2 Placement	Monday, 24 June 2024
Settlement of Tranche 2 Placement Shares	Wednesday, 26 June 2024
Allotment and commencement of trading of Tranche 2 Placement Shares	Thursday, 27 June 2024

Further project financing arrangements

Alpha has received non-solicited advanced proposals for alternative and non-dilutive financing arrangements from a number of parties to fund the Stage 2 capital requirements. These include advanced proposals for alternative financing to fund any further of the Stage 2 capital requirements. Alpha continues to evaluate the most appropriate funding sources with the aim of minimising dilution to shareholders and providing Alpha with the optimal funding mix. Alpha will provide further detail on any further project financing arrangements of Stage 2 in due course.



APPENDIX A: HPA FIRST PROJECT STAGE 2 DEFINITIVE FEASIBILITY STUDY

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APPENDIX A: STAGE 2 HPA FIRST PROJECT DEFINITIVE FEASIBILITY STUDY

1. STAGE 2 DFS OVERVIEW

The HPA First Stage 2 Definitive Feasibility Study (**DFS**) was completed by Prudentia Engineering Pty Ltd (**Prudentia Engineering**) of Brisbane, Australia, with inputs from Alpha and the proprietary solvent extraction (**SX**) and refining technology licensor, HP Alumina Pty Ltd.

The DFS is based on the construction of Stage 2 on the existing HPA First Project site at Yarwun, near Gladstone, and builds upon:

- an extensive 4+ year product marketing and parallel product development effort, to maximise Alpha's
 process capability with the highest demand growth markets;
- the successful construction, commissioning and 16+ months of operation to date of the Stage 1 PPF Facility; and
- a comprehensive re-design and re-engineering of the Stage 2 facility to capture process refinements, expanded product range capability as well as key customer requirements.

The DFS has been drafted to the equivalent of a Class 3 AACE (Association for the Advancement of Cost Engineering) Estimate and accuracy of -10% to +15% at the 80% confidence level.

The project capacity will be 10,430 metric tonnes of high purity aluminium materials across Alpha's product range.

2. TECHNOLOGY AND PROCESS FLOW

Alpha's key process advantage is the application of proprietary SX technology to aluminium extraction and purification. Alpha holds the global and exclusive access to the process technology for a 20 year term through to 2037 with rolling 5 year extensions at Alpha's discretion. The process uses established SX techniques, repurposed to provide for the highly selective extraction of Al^{3+} cations from an aluminium-loaded liquor (**PLS**). The purified Al^{3+} stream is then directed to a crystallisation circuit to generate 5N+ aluminium nitrate crystal.

The aluminium nitrate crystal forms the precursor to the remaining high purity aluminium products.

The process provides for the flexibility to produce a wide range of products at very high purities and at a disruptively lower operating cost and carbon footprint than incumbent processes.

The process technology is the result of 10+ years of process development, with Alpha as the sole global and exclusive licensee. The process technology and mass balance are protected by stringent trade secret provisions. The process flow sheet includes no mining operations or tailings disposal and uses established, atmospheric pressure wet chemistry processes with novel chemistry. The Project sources its bulk alumina-trihydrate feedstock locally from Rio Tinto within the Gladstone State Development Area.

It has been developed to operate at high concentration, leading to a relatively compact processing plant with high recycling of materials and low levels of waste production.

The two large volume chemical reagents will be sourced directly by pipeline from the neighbouring Orica Yarwun Facility. The reagents are combined into the by-product, which will be delivered back to Orica by pipeline, to be integrated within their process.

With close to 100% of reagent to by-product recycle, the process generates only very minor waste residues, allowing the Project to be located within the Gladstone SDA industrial zone.



HPA First Process Flow– Simplified Block Flow Diagram

The process flow sheet used in this DFS is based on extensive pilot scale and demonstration scale testwork, the 2020 Definitive Feasibility Study and the subsequent 16+ months of operations of the Stage 1 PPF facility.

Key conclusions and outcomes from the testwork, pilot, demonstration and PPF operations and DFS include:

- During piloting over 10,000 hours of operation have been performed with consistent production of high purity intermediate and final products. Final HPA quality is at target 4N purity and close to 5N purity.
- The process has been operated in the Stage 1 PPF at small commercial scale and has reliably and consistently produced on-specification aluminium nitrate crystal with over 250 tonnes of production to date.
- The Stage 1 PPF has also established stable production of high purity gamma and alpha phase aluminas at >500kg per week at >4N5 (99.995%) target purity levels. The Stage 1 PPF has also established production of high purity alumina hydrates at target 4N5 purity levels.
- High purity aluminas and high purity alumina trihydrate produced to date, from all sites, has met target specification for crystal structure, morphology and surface area.
- The process design basis and mass balance for integrated operation was validated and refined, with the data used for Stage 1 PPF and commercial facility as costed in the DFS.
- Dilute and concentrated by-product solution produced from piloting and the operation of the Stage 1
 PPF meets the expected specification set by Orica.
- All unit operations proposed to be adopted for the integrated process were first tested in laboratory and pilot, and the first half of the process integrated and operated reliably at the Stage 1 PPF facility.
- The commercial plant equipment is a modest capacity/size compared to most industrial process plants. Operating conditions are not severe and materials of construction are simple, available and well understood. Scale-up risks are therefore expected to be low.

- The commissioning of the Stage 1 PPF showed the robustness of the process in its ability to produce on spec material within a few days of start-up. The Stage 1 plant began operations at ~60% instantaneous throughput and has consistently run at over 90% ever since.
- Key learnings around the process for crystallisation have been incorporated into the design considerations for the Stage 2 commercial plant which will enhance availability of the equipment. Other minor material handling opportunities have also been identified and considered for the final design.

The previous HPA First Pilot Plant and Demonstration Plant, (now the **Product Development Centre**) in Brisbane also continues to process multiple batches of ultra-coat aluminium-hydroxide coatings for anode suppliers using high purity Al-nitrate product as a precursor.

The Stage 1 PPF in Gladstone has established small scale commercial manufacture of aluminium nitrate as well as gamma and alpha phase HPA together with sintered HPA tablets for synthetic sapphire glass production. Stage 1 production includes HPA products for sale to high value customers.

The Company is pleased and confident with the consistent performance of the downstream technology in use.

3. PRODUCT MIX AND PRODUCT MARKETING

3.1. Product Mix and Production Profile

Based on the detailed market engagement and the attendant price discovery, together with consideration of optimised plant engineering and financial margins, Alpha has completed the DFS based on the production profile set out below:

Product	Chemical Formula	Stage 2 Production Volumes (tpa)	End-use markets - based on existing engagements
5N Purity Aluminium Nitrate	AI(NO ₃)3.9H ₂ O	3,500	Li-B electrode coatings, catalysts and micro-LED phosphors
4N5+ Purity Alpha Phase Alumina Powder	Al ₂ O ₃	3,200	Semiconductors (thermal interface and CMP), LED phosphors, technical ceramics and Li-B cathode doping. This includes HPA for tablets as feedstock for synthetic sapphire (LED and Optics)
4N5+ Purity Gamma Phase Alumina Powder	Al ₂ O ₃	2,000	Li-B cathode doping and coating, semiconductors (CMP), specialty catalysts
4N5+ Purity Alumina Trihydrate ('ATH')	Al(OH)₃	1,700	As seeded powders for nano-alumina for semiconductor CMP, Li-B cathode dopants, specialty catalysts, adsorbent precursors, HPA precursors and glass dopants
4N5+ Purity Nano-Alumina Powder	Al ₂ O ₃	30	Semiconductors (CMP) and Li-B cathode coating/ doping
		10,430	

The adoption of the production of multiple aluminium products and the focus on bespoke alumina products are key contributors to the improved outcomes of the Stage 2 DFS.

The benefits of multiple products include:

- deeper and accelerated end-user engagement in being able to provide multiple product requirements to individual customers;
- enables product margins and volumes to be maximised based on the market opportunity presented; and
- enables Alpha to direct production volumes to highest demand and/or higher margin opportunities.

Boehmite, ATH and nano-alumina

Over the past 24 months Alpha has developed a process flow sheet for the manufacture of two forms of high purity alumina hydrate, being boehmite (**AI-O-OH**) and alumina trihydrate (**AI(OH)**₃, or '**ATH**').

Alpha has now expanded existing process capacity within Stage 1 of the HPA First Project to produce boehmite, ATH and nano-alumina.

Per the product mix table above, the Stage 2 project is expected to produce 1,700tpa of ATH. However, the ATH circuit has been engineered to include the capability to manufacture up to 2,000 tonne of ATH and can equally be calibrated to manufacture high purity boehmite.

Both boehmite and ATH will be dominantly marketed as precursors to manufacture nano-alumina by third parties, targeting the CMP sector. This is strongly supported by mature market engagement and end-user product testing.

Post Stage 2, the Stage 1 circuit can be expanded with minimum capital (~A\$1M) to produce 30tpa of Alpha's proprietary nano-alumina.

Comprehensive technical studies of the performance of Alpha's nano-alumina in CMP application indicate superior performance against incumbent market suppliers.

3.2. Product Marketing and Product Pricing

On 8 May 2024, Alpha announced the comprehensive marketing outreach and product marking activities of the Company and the process of price discovery as key inputs to the financial outcomes of the Stage 2 DFS.

In summary these activities include:

- The development of a detailed understanding of the end-user environment through the extensive use of market consultants and technical research partners.
- A global engagement with end user markets through the expansive use of marketing agents, market intermediaries, Government agency support and trade shows.
- Market engagement support with the manufacture and distribution of over 220 test sample materials to date to over 125 end-users, supported by the development of a comprehensive in-house product characterisation capability.
- The development of a market-driven build-up of a conservative, demand volume weighted, product market pricing matrix based on sales, letters of intent (**LOIs**) and refined, live quotations.
- The use of third-party consultants to develop a detailed, independent analysis of global HPA and aluminium nitrate markets and pricing.

Alpha's market research consolidated the following sectors and product applications as the key targets for Alpha's product marketing:



The current status of key product marketing phases is described below, showing current product volume indications.

Engagement Phase	Volume indication (tpa)	Coverage
NDA signed	29,150	279% of Stage 2 capacity
Product samples sent	30,050	288% of Stage 2 capacity
Positive feedback received on samples sent	25,900	248% of Stage 2 capacity
Follow-up testing under way	25,400	244% of Stage 2 capacity
LOIs signed (6 end-users to date)	up to 2,290	22% of Stage 2 capacity

The scale and degree of end-user engagements provide Alpha with high confidence it will continue to convert technical engagements into commercial outcomes.

3.3. Product Pricing

Summary findings based on the comprehensive marketing process to date are set out below:

	Real Product Pricing (US\$/kg)								
		Alpha HP	A Market Discove	ry*	Indeper	ident Consu	iltants		
Product	Low	High	Demand Vol Weighted Avg**	HPA Eq***	CM Group (CY27)	GLG	HPA Eq***		
5N Purity Aluminium Nitrate	15.0	350.0	18.5	123.3	n/a	20 - 30	125.0		
4N5+ Purity Alumina	20.0	68.5	32.0	32.0	39.3	n/a	39.3		
4N5+ Purity Alumina for pucks	20.0	30.0	25.0	25.0	35.0	n/a	35.0		
4N5+ Purity Gamma Alumina	13.0	30.0	20.3	20.3	27.5	n/a	27.5		
4N5+ Purity Alumina Trihydrate	12.5	20.0	15.0	23.1	19.4	n/a	29.8		
4N5+ Purity Nano-Alumina	33.0	44.0	43.0	43.0	50.0	n/a	50.0		

* Alpha HPA Market Discovery: Prices reflect the real prices discovered by Alpha throughout the 4+ year product marketing campaign to over 200 potential end-users.

****Demand Vol Weighted Average:** Average prices weighted by volumes indicated from customers and potential end-users, and/or sales achieved.

*** **HPA Eq:** Is calculated from Demand Vol Weighted Average

4. MARKET THEMATICS

4.1. Macro

To complement the Company's detailed market engagement described above, Alpha notes the following macro thematics, which are considered constructive to the Company's marketing efforts and strong pricing outcomes:

- government support for 'friend-shoring' of critical material supply chains, both in Australia and target customer jurisdictions;
- end-user commitments to de-carbonising supply chains; and
- strong growth in target end-user sectors, particularly power-semiconductors, LED lighting and Li-B sectors.

4.2. Semiconductor Sector

The semiconductor sector is undergoing a major demand inflection in power-electronics ('power-semis') to support new sector growth from Artificial Intelligence (**AI**), electric vehicles (**EVs**) and gaming.

A key subset of this trend is the increasing adoption of silicon-carbide (**Si-C**) substrates with attendant demand for:

- HPA based thermal interface materials; and
- HPA based abrasives for Si-C substrate polishing (CMP).

4.3. Lithium-Ion Battery Sector

Within the wider, well-established trend of Li-B technology driving e-mobility, consumer electronics and energy storage, the following factors are considered favourable to Alpha's product marketing efforts:

- the focus on higher energy density battery chemistries, many of which require high purity aluminium materials for cathode coatings and dopants for cathode stability; and
- the wider regulatory and EV manufacturer focus on Li-B fire prevention is considered strongly favourable for the accelerated testing, and adoption of this coating technology, enabled by the establishment of commercial scale aluminium nitrate production by Alpha.

4.4. Opportunities

In the process development for Alpha's expanded product offering, the Company has identified the following, potential significant, opportunity to enhance the Project's deliverables and financial basis:

 Ultra Aluminium Nitrate: The Stage 2 operation is configured with material handling capacity for Alnitrate product of 3,500tpa and, dependent on test-work with cathode and anode material manufacturers as well as Li-ion cell manufacturers, the potential exists for demand to significantly increase. With the Al-nitrate product also functioning as a precursor to all our other products, Alpha has the ability to increase Al-nitrate sales without process changes or a significant impact on downstream product volumes. If realised, this opportunity would enable improved margins whilst focusing on high margin alumina customers, raising the average HPA equivalent price realised.

5. CAPITAL EXPENDITURE

The HPA First Stage 2 Project has been estimated at **A\$553M** at -10% to +15% accuracy, and includes A\$79M contingency and \$32M in growth allowance.

The Prudentia Engineering team in conjunction with Alpha management have developed the engineering design, layout, mass balance PFD and P&ID drawings, 3D modelling and other necessary design work to sufficiently estimate the material take-offs, sizing of equipment and civil design to allow the estimating team to assemble this estimate.

5.1. Basis of Capital Cost Estimate

The scope used in the estimate includes:

- Leaching, Filtration and Ion Exchange
- Solvent Extraction
- Crystallisation and crystal bagging
- HPA Precursor Production
- Drying, Calcination, Gamma Packaging
- Milling and HPA Packaging
- Aluminium Trihydrate (ATH) Production, drying and Packaging
- By-Product Evaporation
- Reagents
- Utilities including cooling water and steam
- Infrastructure including administration, control room, laboratory and maintenance facilities

Other considerations used in the estimate include:

- the estimate is presented in Australian Dollars, using an AUD:USD exchange rate of 0.70;
- the estimate is based on an Integrated Owners Team (IOT) execution model with sub-contractors for engineering and site works. This is building on the Company's experience in executing the Stage 1 PPF project in the same local government area (LGA);
- major mechanical equipment costing is based on the current equipment list with budget quotes sourced for major equipment;

- bulk materials estimate is based on detailed material take-offs (MTOs) with costs built up from first principles and checked with quotes from contractors to ensure alignment with current market pricing. The 3D model was a key input to determining the MTOs for the estimate;
- bulk materials estimate is based on detailed MTOs with costs built up from first principles and checked with budget quotes from contractors to ensure alignment with current market pricing;
- construction labour has been based on current labour agreements and contractor budget quotations. Labour rates include contractors' direct labour costs, R&R provision, profit, overheads, construction plant and direct labour costs;
- indirect costs, including project management, engineering, procurement, and construction management, spares, first fills and temporary construction facilities, have been included based on estimates aligned with the execution schedule and strategy;
- contingency has been based on a probabilistic methodology. Maximum and minimum possible final cost outcomes were applied to components of the estimate. A Monte Carlo simulation was used to predict overall project maximum and minimum costs outcome and contingency applied to give an 80% confidence of underrun (P80); and
- all costs are exclusive of goods and services taxes, value added taxes, import duties and other taxes.

5.2. Capital Estimate

The tabulated, detailed capital estimate is presented below:

Description			Cost Estimate (Including growth)
Description	Estimated Cost A\$000	Growth* A\$000	Total Cost (A\$000)
Earthworks	\$11,017	\$757	\$11,774
Civils	\$10,842	\$848	\$11,690
Concrete	\$36,311	\$3,102	\$39,413
Steelwork and other structural	\$25,173	\$2,273	\$27,446
Buildings and architecture	\$4,532	\$37	\$4,569
Fire and safety Equipment	\$2,441	\$293	\$2,734
Freight	\$11,465	\$0	\$11,465
First Fills	\$5,196	\$260	\$5,456
Permanent mobile equipment	\$277	\$14	\$291
Mechanical Bulks	\$35,175	\$2,821	\$37,996
Mechanical Equipment	\$99,643	\$8,729	\$108,372
Piping	\$48,799	\$4,024	\$52,823
Electrical equipment	\$38,370	\$2,736	\$41,106
Electrical conduit and racking	\$8,810	\$705	\$9,515
Wire and cable	\$24,006	\$2,103	\$26,109
Instrumentation and control	\$6,490	\$609	\$7,099
Computerised Control Systems	\$1,936	\$194	\$2,130
Indirects/IOT	\$71,397	\$2,881	\$74,278
Contingency (15% of Directs + Indirects)	\$78,911	\$0	\$78,911
TOTAL INSTALLED COSTS	\$520,791	\$32,386	\$553,177

* Growth allowance has been allocated to each line item of the estimate which reflects the level of definition of the base information, i.e.:

- level of engineering input;
 possible quantity growth: and
- possible quantity growth; and
 materials and equipment pricing compared
- materials and equipment pricing completeness.

These allowances are not intended to provide for changes in scope and standards due to improving project definition and are not to be considered contingency items.

Since the COVID 19 global pandemic, costs for mechanical equipment and bulk material quantities have escalated substantially, in part due to holding costs, lower inventory and a shift in the global supply chain away from Foreign Entities of Concern (**FOEC**). The Company has sought to mitigate these challenges and the cost implications of them where possible.

6. OPERATING COST ESTIMATE

The operating cost estimate shows a nominal operating unit cost of A\$9,578/t (US\$6,705/t) after accounting of by-product credits.

6.1. Basis of Operating Cost Estimate

The operating costs (**OpEx**) have been split into variable and fixed costs and have been estimated by Prudentia Engineering and Alpha using the following key assumptions:

- reagent consumption from the mass balance model;
- reagent costs from suppliers including Orica, using definitive agreements and existing suppliers to the Stage 1 PPF;
- labour costs from actual costs incurred for labour at the Stage 1 PPF operation; and
- labour head count estimate based on the Company's organisational structure, labour requirements and labour/management market intelligence.

The operating cost estimate considers all key elements of the operation in nominal operating state at nameplate capacity of 100% including:

- labour;
- reagents and consumables;
- utilities;
- maintenance costs; and
- general and administration.

Other key assumptions of the operating estimate are as follows:

- all figures are in Australian Dollars;
- operating costs are on a yearly basis;
- growth and contingency allocations are not included;
- product transport costs are not included;
- depreciation and other similar costs are not included;
- sustaining capital is not included; and
- off-specification disposal costs are not included.

Operating Costs					
	Item	Cost (A\$000)			
	Feedstock and transport	\$5,615			
	Reagents and Tolling Fee	\$30,234			
VARIABLE COSTS	Utilities	\$14,719			
	Consumables	\$2,004			
	Environmental costs	\$2,094			
то	TAL VARIABLE	\$54,666			
	Labour	\$21,519			
	General	\$8,873			
FIXED COSTS	Maintenance	\$13,031			
	Contract services	\$1,396			
	Property and Land	\$413			
	TOTAL FIXED	\$45,232			
тот	AL OPEX (+/-15%)	\$99,898			

Note: Operating estimate does not include any potential impact of the Budget measures relating to critical minerals tax credits delivered as part of the Federal Budget on Tuesday 14 May 2024.

7. PROJECT APPROVALS

In preparation for the construction of Stage 1, approvals for both Stage 1 and Stage 2 were granted in late 2021 based on the layout of Stage 2 expected at that time. With the slightly modified layout confirmed to accommodate additional product lines, the following minor amendments to existing approvals will be required:

- **Development Approvals**: The major Material Change of Use (**MCU**) development application was approved in October 2021. Alpha is in the process of finalising a minor amendment to accommodate the updated Project layout.
- Environmental Authority: As part of the commencement of Stage 1 operations, an Environmental Authority (EA) was approved that considered Stage 1 operations and the intended environmental operating strategy of Stage 2 based on the layout. With the permit already in place, amendments to the existing EA becomes part of routine operations.
- **Construction Level Approvals:** Formal council construction works approvals will be required from the Gladstone Regional Council (**GRC**) which will follow the approved amendment of the MCU. The engineering required for this is in progress as part of an early engineering package of work. The same process was followed during the Stage 1 construction process.
- Utilities: Alpha has connection agreements in place for renewable electricity supply and is in negotiations with renewable energy retailers for Stage 2 supply. A water supply contract with the Gladstone Area Water Board (GAWB) for both raw and potable water is in place. An offer to connect to the Queensland Gas Pipeline (QGP) is currently being sought and the engineering for the pressure let-down station located at site is being updated for the new demand.

A full summary of the project approvals is set out in the below table.

Since 2019, Alpha has engaged AECOM to assist with permitting and approvals. The Company secured freehold land and took possession of the Project site in November 2021. In January 2021, the major Material Change of Use (**MCU**) approval was granted by the Queensland Government. In October 2021, Alpha received approval for the amended MCU and Environmental Authority (**EA**) to include the addition of the Stage 1 PPF.

Approval	Act	Status
EPBC Referral/Approval	Environmental Protection and Biodiversity Conservation Act 1999	Self-Assessment – no Referral required
State Development Area Approval (Material Change of Use)	State Development & Public Works Organisation Act 1971	 MCU Approval received January 2021 MCU Amendment approved October 2021 (to accommodate PPF) Additional minor amendment required for new product mix and layout changes
Operational Works approval for vegetation clearance	State Development & Public Works Organisation Act 1972	Exemption Received
Environmental Authority (EA)	Environmental Protection Act 1994	 Amended EA Received March 2022 Additional EA amendment required to accommodate the new layout in progress with AECOM to enable pre-lodgement meeting. Lodgement timing is post MCU amendment approval.
Major Hazard Facility (MHF) Licence	Workplace Health and Safety Act 2011	 Project application lodged with the QLD Major Hazards Unit (MHU) Formal notification to be made in 2025 as part of safety case development timing
Operational Works Permit for Physical Construction	State Development & Public Works Organisation Act 1972	 Various Ops Works Permits required from the Gladstone Regional Council (GRC)
Trade Waste Access (Yarwun Distributions System YDS)	Gladstone Regional Council Infrastructure Planning	 LOI from GRC received for connection to the YDS. EA amendment submitted to DES (22 November 2023) for updated wording to enable GRC to issue access permit. Wording has been reviewed by GRC with no objection

8. CONSTRUCTION TIMING AND SCHEDULE

Stage 2 Project execution will commence immediately on the existing HPA First Project site at Yarwun, near Gladstone, Queensland.

In preparation for completion of the Stage 2 DFS, Alpha has advanced a number of key elements of the Stage 2 Project implementation, including:

- Appointment of key staff to the Project including, General Manager Projects and General Manager – Manufacturing.
- Recruitment and onboarding of key Integrated Owner's Team (IOT) members, including:
 - Site construction manager.
 - Prudentia Engineering engaged for detailed engineering and design.
 - o Turner & Townsend engaged for project controls and procurement support.
 - \circ $\;$ Other key Alpha staff roles within the project have been filled.
- Engineering design works, with a focus on key areas in order to progress critical path items including:
 Completion of early earthworks design for the site.
 - Baseline soil and water sampling in preparation for construction.
 - Haulage road through State Development land for imported fill identified to minimise haulage costs.
 - Structural, Mechanical and Piping (SMP) contractor early engineering design reviews underway.
 - Various engineering engagements with utilities to confirm site survey for utility owned equipment on site (Jemena and Ergon).

Near-term priorities include continuing front-end engineering and ordering of long-lead items, followed by building and civil works to meet first production targeted for 1H FY27.

The sequencing of the schedule has been compiled for an appropriate level of detail for the DFS. The SMP contractor provided a detailed schedule as part of their proposal which has been incorporated into the schedule to assist with constructability considerations at this stage of the project.

The schedule does not consider unforeseen macro impacts such as a pandemic, geopolitical instabilities, extreme weather events either at site or globally that could impact equipment delivery or delivery of parts and pieces to our vendors as well.

Under the production ramp-up schedule adopted, and approved by Lenders' engineers, the Company expects to be at an 87% throughput rate by FY28, per the ramp up schedule below:



Stage 2 HPA First Project – Simplified Project Construction Schedule:

		20	24			20	25			20	26			20	27	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Stage 1																
HPA production line ramp-up and production																
Stage 2																
Product marketing and customer contracts																
Financing					8 9 9 9 9 9				8 9 9 8 8 8 8							
Financial approval (FID)	X	×														
Front-end engineering																
Major contract award																
Long lead time orders																
Vendor manufacturing and supply																
Buildings and civil works																
Plant assembly																
Water commissioning																
Chemical commissioning																
Plant handover										×	×					
Production ramp up and start																



9. PROJECT EXECUTION

Stage 2 will be executed using an Integrated Owners Team (**IOT**) execution model as opposed to an EPCM methodology. The IOT model provides a better structure for managing Alpha's sensitive process IP and drives a stronger cost-ownership culture. The IOT will comprise of a combination of Prudentia Engineering, a Procurement and Project Controls contractor and Alpha management. In addition, a fully integrated Design and Construct (**D&C**) Structural, Mechanical and Piping (**SMP**) contractor has been involved with the DFS cost estimate and will be responsible for detailed shop drawing design in house for the entire SMP scope. Key IOT members have been retained from the successful execution of the Stage 1 PPF.

Early onboarding of both Electrical and Instrumentation (**E&I**) and Civil/Earthworks contractors is also key to the strategy. The rationale for the IOT strategy is as follows:

- both Prudentia Engineering and Alpha management have been working deeply within the engineering and process technology for 5 years and the incumbent knowledge will streamline engineering design rather than having to impart this knowledge onto an EPCM contractor;
- ensures complete alignment of project outcomes;
- the SMP D&C contractor will reduce on site rework as they will be responsible for shop drawings, isometric piping drawings and modular construction to ensure minimal rework on site;
- early onboarding of key SMP D&C and E&I contractors will minimise engineering costs and ensure
 efficient constructability through a modularisation approach. Interfaces are to be minimised with this
 approach but traditional battery limits under an EPCM strategy are still relevant in terms of commercial
 packages such as SMP D&C, Civil/Structural, E&I, System Integration, basic Engineering, Procurement
 and Construction Management;
- key Alpha management appointed in the project organisation chart with considerable experience in project delivery and operations will be incentivised in line with the business objectives; and
- as the IOT progresses engineering and procurement, the construction and project controls team will
 expand to support the construction phase while others within the IOT will transition to Gladstone to
 support construction activities along with existing Stage 1 PPF employees to be seconded to
 construction where appropriate.

The following diagram sets out the IOT structure:





10. ADDITIONAL INFORMATION

10.1. DFS methodology

The DFS has been compiled by Prudentia Engineering in conjunction with Alpha using the following workflows and responsibilities:

Process	Description	Responsibility/Input
Demonstration Plant	Operation of the HPA Precursor circuit, drying and calcination on 24/7 basis at the Stage 1 PPF. Design, construction, and operation of the new ATH circuit at the Product Development Centre in Murarrie	Alpha HPA Ltd Prudentia Engineering Ltd HPAlumina Pty Ltd
Stage 1 PPF	Engineering design, permitting, construction and operations of the Stage 1 PPF and subsequent opportunities for improvement	Alpha HPA Ltd Prudentia Engineering Ltd HPAlumina Pty Ltd
Engineering	 General arrangement and layout and 3D model Equipment sizing basis Mass, heat and water balance verification PFD and P&ID development Vendor engineering engagement Early procurement activities including commercial proposals for key equipment and contractors Material take off quantities (MTOs) Electrical load list and single line diagrams (SLDs) Updated utility requirements 	Prudentia Engineering Ltd HP Alumina Pty Ltd
Cost Estimation	Operating cost (OpEx) and capital expenditure (CapEx) estimations	Alpha HPA Ltd Prudentia Engineering Ltd
Permitting and Approvals	Development of documentation and submissions for key government regulatory permits and applications to facilitate construction and operation of the Stage 2 project	Alpha HPA Ltd Prudentia Engineering Ltd AECOM
Marketing	Comprehensive market outreach program with over 200 end-users across the LiB, LED semiconductor and specialty materials applications sectors	Alpha HPA Ltd CM Group CRU GLG Group

10.2. Project Location

The Project site is located at Yarwun, Reid Road, 9km West of Gladstone in Queensland, Australia. It is part of the Gladstone Regional Shire Council located within the Gladstone State Development Area (**GSDA**) Yarwun Precinct, which is administered by the Department of State Development, Infrastructure and Planning.

Gladstone is approximately 520km north of Brisbane and is one of Queensland's largest industrial centres with large chemical and minerals processing plants including Queensland Alumina Ltd (**QAL**), Rio Tinto Alcan alumina refinery, NRG Gladstone Power Station, Curtis Island LNG plants, Wiggins Island Coal Terminal, Boyne Island Aluminium smelter and Orica's ammonium nitrate plant.

The town of Gladstone has a population of around 50,000 people with established services to facilitate both construction, maintenance and operational activities including:

- established trade and engineering services for fabrication, machinery and processing facilities;
- equipment hire companies;
- schools and community facilities;
- recreational and lifestyle attributes; and
- a range of housing types to attract and retain workers.

The site was selected for the Project due to adjacency to Orica's Yarwun plant which will supply key reagents for the Project and offtake the process by-product. The site is also 2.5km by road to the Rio Tinto Yarwun



alumina refinery, which supplies the HPA First Project with raw alumina trihydrate feedstock.

The Project site is also supplied with a Jemena LNG let down station, raw water pipeline access and 11kVA electrical connection.



HPA First Project Location, Yarwun, Queensland showing adjacency with Orica Yarwun Facility

10.3. Project Layout

The plant layout has been configured to minimise distance between key unit operations, allow access to equipment for construction, maintenance and operation. The general layout is shown below. Equipment has been sized according to the mechanical equipment list developed for the DFS.



3D Layout Schematic – Stage 2 HPA First Project



10.4. Reagents and Utilities

In addition to the large volume reagents supplied by Orica, the operation requires the following reagents and utilities:

- **Organic Extractants:** Suppliers have been secured for the relevant extractant using contract mechanisms to ensure IP protections are in place. The products are available at appropriate volumes and lead times to service the project and its ongoing operations.
- **Diluent:** A standard dilution product used to set the appropriate concentration of extractant in the organic mix for the solvent extraction circuit.
- **Other reagents:** Bulks storage and suitable buffer capacity is in place for the project and its operations.
- **Gases:** The various gases required for the operation will be stored in pressurised bullets located on site and are readily available by local suppliers.
- **Natural gas supply:** The steam boilers and drying/calcination equipment is fired by way of a natural gas supply connected to the Queensland Gas Pipeline (**QGP**). Jemena, the gas transporter, are preparing an offer to connect to the QGP and discussions are underway for gas retail supply. Hydrogen enrichment is also being investigated as part of the supply.
- **Power:** Renewable electricity will be supplied to site as part of the Company's commitment to decarbonisation. Contract negotiations are underway and the connection agreement with the transmission company, Ergon, is already executed to de-risk the schedule.
- Water: Both raw and potable water supply agreements are in place as part of the Stage 1 PPF project with the potable water connection already complete and in use. The Gladstone Area Water Board will commence works post FID to install the raw water supply per the engineering design.
- **Sewer:** Existing connection in place for Stage 1 PPF and additional ties required as part of Stage 2 and will be covered as part of the construction permits.
- **Data:** The Company has an existing dedicated fibre connection to the administration building as part of the Stage 1 PPF with 500Mbs symmetrical speed to enable state of the art controls, remote video monitoring and conferencing capabilities.

10.5. Reagent Supply and By-Product Offtake

The Alpha process provides for two large volume chemical reagents to be recycled as a by-product to the supplier on an almost 100% basis. Following approximately 2 years of commercial and technical diligence, in August 2021, Alpha and Orica executed definitive agreements for the supply of reagents and offtake of by product from/to the adjacent Orica Yarwun site.

In summary the agreements comprise:

- a Project Implementation Agreement (**PIA**) where the PIA describes the capital investment obligations of the parties and the scope for project commissioning and reagent and by-product validation trials;
- a long-term, Supply and Offtake Agreement (**SOA**) which describes the pricing, volume and product delivery of the process reagents and the process by-product, as well as the technical details of by-product management and QA/QC protocols; and
- a Products Pre-Pay arrangement.

Alpha and Orica subsequently modified the agreements to provide for the earlier supply/offtake of reagent and by-product from the Stage 1 PPF. Alpha and Orica have been operating under the modified agreement since October 2022.

Orica and Alpha maintain a regular technical and commercial dialogue on project progress through the Engineering Cooperation Group (**ECG**). This committee evolves into a Joint Operations Committee (**JOC**) on commencement of Stage 2 operations.



About the HPA First Project

The Company's HPA First Project represents the commercialisation of the production of high purity aluminium materials using the Company's proprietary, exclusively licensed solvent extraction and HPA refining technology. The disruptive, low-carbon process technology provides for the extraction and purification of aluminium from an industrial feedstock to produce 4N (>99.99% purity) and 5N (>99.999% purity) aluminium materials for sale into high technology markets including the semiconductor, lithium-ion battery and LED lighting sectors.

Alpha is now in production at its HPA First Project Stage 1, Precursor Production Facility (PPF). The Stage 1 facility is being expanded to produce the full range of Alpha's high-purity aluminium materials with \$15.5M grant funding from the Australian Government.

This release represents an updated Definitive Feasibility Study and FID for Stage 2 of the HPA First Project, being the full commercial scale deployment of the process technology on the same site, and now incorporating an expanded list of high purity aluminium-based products, operational experience from demonstration and Stage 1 plant operations and detailed feedback from Alpha's ongoing product outreach and product marketing work.

For further information, please contact:

Rimas Kairaitis Managing Director <u>rkairaitis@alphaHPA.com.au</u> +61 (0) 408 414 474 Robert Lord Investor Relations <u>rlord@alphaHPA.com.au</u> +61(0) 400 008 553 Cameron Peacock Business Development <u>cpeacock@alphaHPA.com.au</u> +61 (0) 439 908 732

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