

ASX Code: IPT

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CORPORATE RELEASE

## Pre-Feasibility Study Underway for the Lake Hope HPA Project in WA

A Pre-Feasibility Study (PFS) is now underway at Impact Minerals Limited's (ASX: IPT) advanced Lake Hope High Purity Alumina (HPA) Project in Western Australia.

The Project, in which Impact is earning an 80% interest, offers the Company the opportunity to become a low-cost entrant into the HPA chemical market, a high-margin business forecast to grow strongly over the next decade (ASX Release March 21<sup>st</sup> 2023).

Lake Hope contains a globally unique deposit of high-grade aluminium clay minerals in the top few metres of a playa salt lake, which has unique physical and chemical properties that will allow for low-cost mining and offsite metallurgical processing via a novel and cost-disruptive acid leaching process.

Preliminary economic studies indicate that the production of HPA and related products from Lake Hope will be cost-competitive with current producers and other developers in Australia and globally (ASX Release March 21<sup>st</sup> 2023).

Impact has appointed the following experienced companies to undertake the work programs for the PFS, which will be completed over the next 12 to 18 months, as well as the work required to lodge a Mining Lease Application in early Quarter 3 this year:

**Maiden Resource Estimation:** H and S Consultants, Brisbane. H and S are well-known resource estimation specialists with specific experience in resource calculations for deposits in Western Australian playa lakes.

**Environmental and Approvals Process Consultants:** Biota Environmental Services, Perth. Biota will complete flora and fauna surveys and also help coordinate the approvals process for the Mining Lease Application.

**Metallurgical Consultants:** Strategic Metallurgy, Perth. Strategic will help oversee and manage the optimisation test work programme for the novel acid leach process, which is currently already underway at ALS Laboratories in Perth. Strategic will also complete process flow sheet design and preliminary engineering studies.

**Mining Studies:** The Mining Engineer Mine Consulting (TME). TME will complete initial mine optimization studies for Lake Hope, which will likely be mined on a campaign basis every few years.

**Financial Modelling:** Platek Analytics. Platek Analytics will review Impact's internal economic model for both the PFS and a Scoping Study, which will be released following the completion of the Mineral Resource Estimate.

The entire PFS will be managed by Roland Gotthard, who discovered the Lake Hope Project and has now joined Impact as Project Manager.

Impact's Managing Director, Dr Mike Jones, said: *"We have hit the ground running since announcing the transformational joint venture at Lake Hope. At short notice, we have assembled a first-class team of consultants to complete the Pre-Feasibility Study work programs over the next 12 to 18 months and drive us towards production. In addition, this work will allow us to release a Maiden Resource and an initial Scoping Study over the next two months, as well as lodge a Mining Lease application in the third Quarter of this year. We have never been busier as we become the next "playa" in HPA."*

### About the Lake Hope Project

The Lake Hope Project covers numerous prospective salt lakes between Hyden and Norseman in southern Western Australia, a Tier One jurisdiction (Figure 1). It comprises one granted exploration licence (E63/2086), covering the Lake Hope deposit already discovered, together with five further exploration licence applications (ELA63/2317, 2318 and 2319, and ELA74/673 and 764) which are poorly explored. The tenements cover about 238 km<sup>2</sup> and are all 100% owned by Playa One.

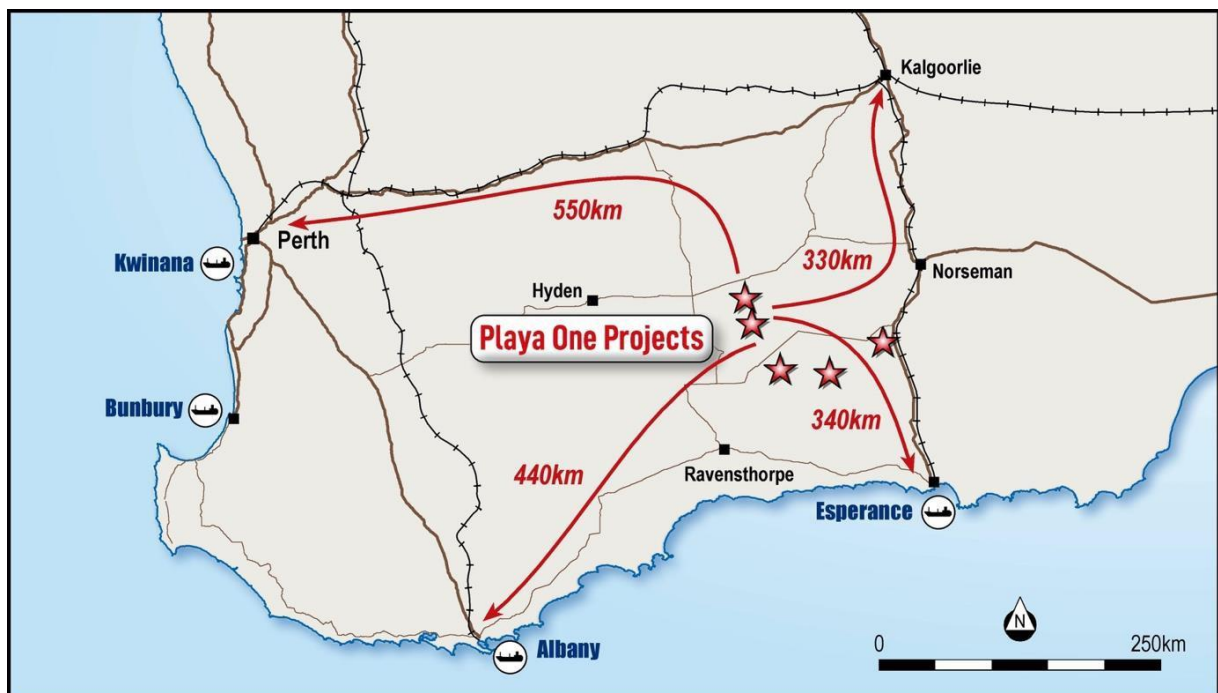


Figure 1. Location of Playa One tenements with options for trucking and off-site processing.

## Geology

The salt lakes of Western Australia are well known for their unique and complex hydrogeochemistry, which has led to the formation of a wide variety of economic minerals and brines within the playa systems. These include the world-class Yeelirrie uranium deposit (>100 Mlb  $U_3O_8$ ), significant potash brines, gypsum and lime-sand resources.

The Lake Hope area has unique climatic and geological characteristics that have resulted in the formation of what is probably a globally unique deposit of aluminium-rich material within the surficial clay layers of two small salt lakes, or “pans”, in the Lake Hope playa system.

The lake clays, which are only up to a few metres thick, have unique chemical and physical properties and consist almost entirely of aluminium-bearing minerals that are plasticine-like in consistency and can be easily sampled with hand-held augers and push tubes (Figure 2).

In addition, particle size distribution analysis demonstrates that virtually all the minerals are less than 16 microns and 60% to 80% occur at grain sizes of less than 5 microns (Figure 3).

These unique characteristics have produced a near-perfect mineral deposit: a very high-value end-product whose parent ore is:

- Very soft and shallow, allowing for extremely cheap free-digging with limited infrastructure requirements, no pre-stripping, no selective mining, a tiny environmental footprint, and limited rehabilitation requirements.
- Naturally fine-grained with no need for crushing and grinding, allowing for transport to an off-site processing facility that can be built on existing industrial sites (Figure 1). In essence, this is Direct Shipping Ore (DSO).
- Comprised of a few minerals that require only simple washing before acid leaching, thus allowing for low-cost straightforward metallurgical processing.

## Drilling and Assay Results

A total of 99 holes have been drilled by hand-held auger and push tube methods across the two lakes, with all samples submitted for assay at Intertek Laboratories in Perth (Figure 2 and see JORC Table in ASX Release March 21<sup>st</sup> 2023 for further details).

The drilling has defined a uniform and coherent layer of aluminium-bearing clay in both lakes that is up to 1.65 m thick in places but still open at depth in most areas.

The assays mainly returned very high grades of aluminium oxide (alumina-  $Al_2O_3$ ) of between 24.5% and 27.8%  $Al_2O_3$  and, significantly, with low amounts of potential contaminants such as CaO (0.05% to 0.08%),  $Fe_2O_3$  (2.4-3.2%),  $Na_2O$  (2-4%) and  $P_2O_5$  (0.05-0.07%). The distribution of aluminium in the lakes is shown in Figure 4.

A maiden Mineral Resource Estimate is currently being prepared in accordance with the JORC 2012 Code, with further infill drilling in progress.



Figure 2. Lake Hope showing the push tube sampling method (!) and an example of the lake clay from the push tube.

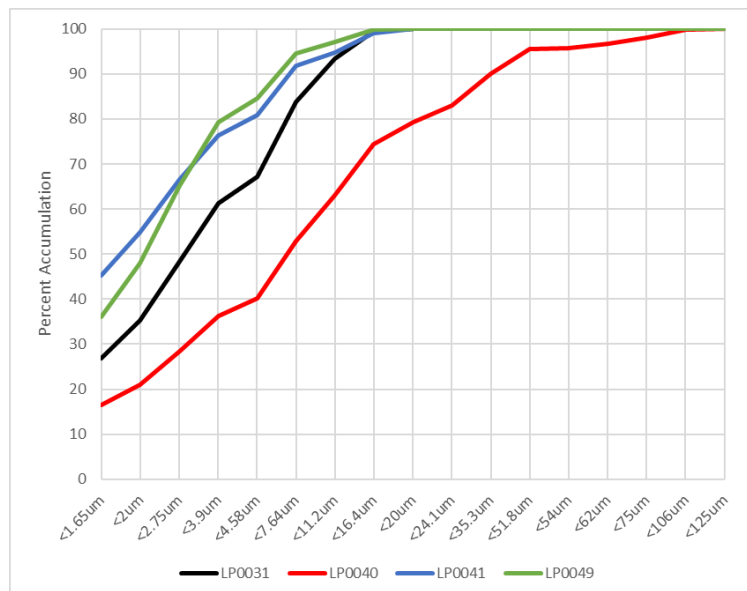


Figure 3. Particle size distribution analysis for four samples. Sample LP0040 contains sandy particles at the base of the deposit.



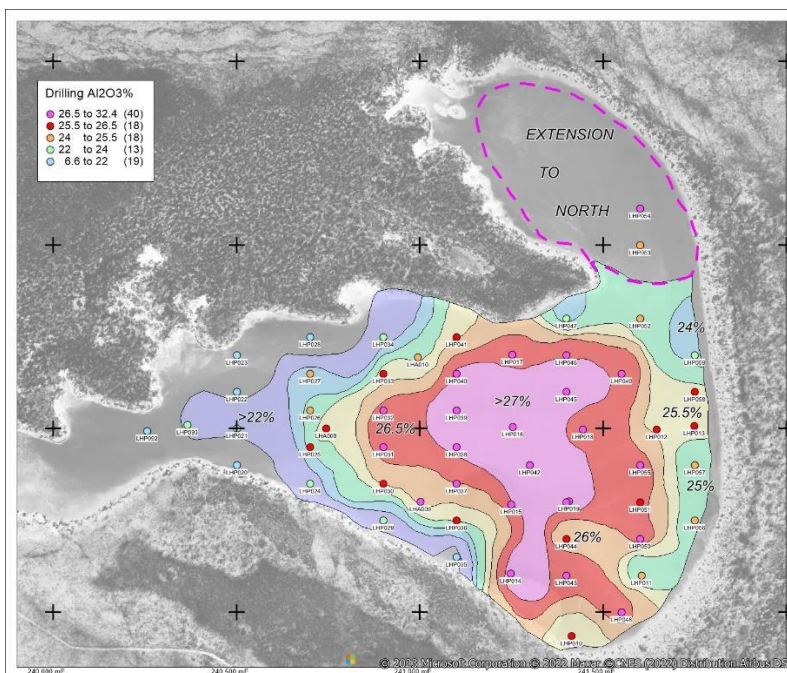
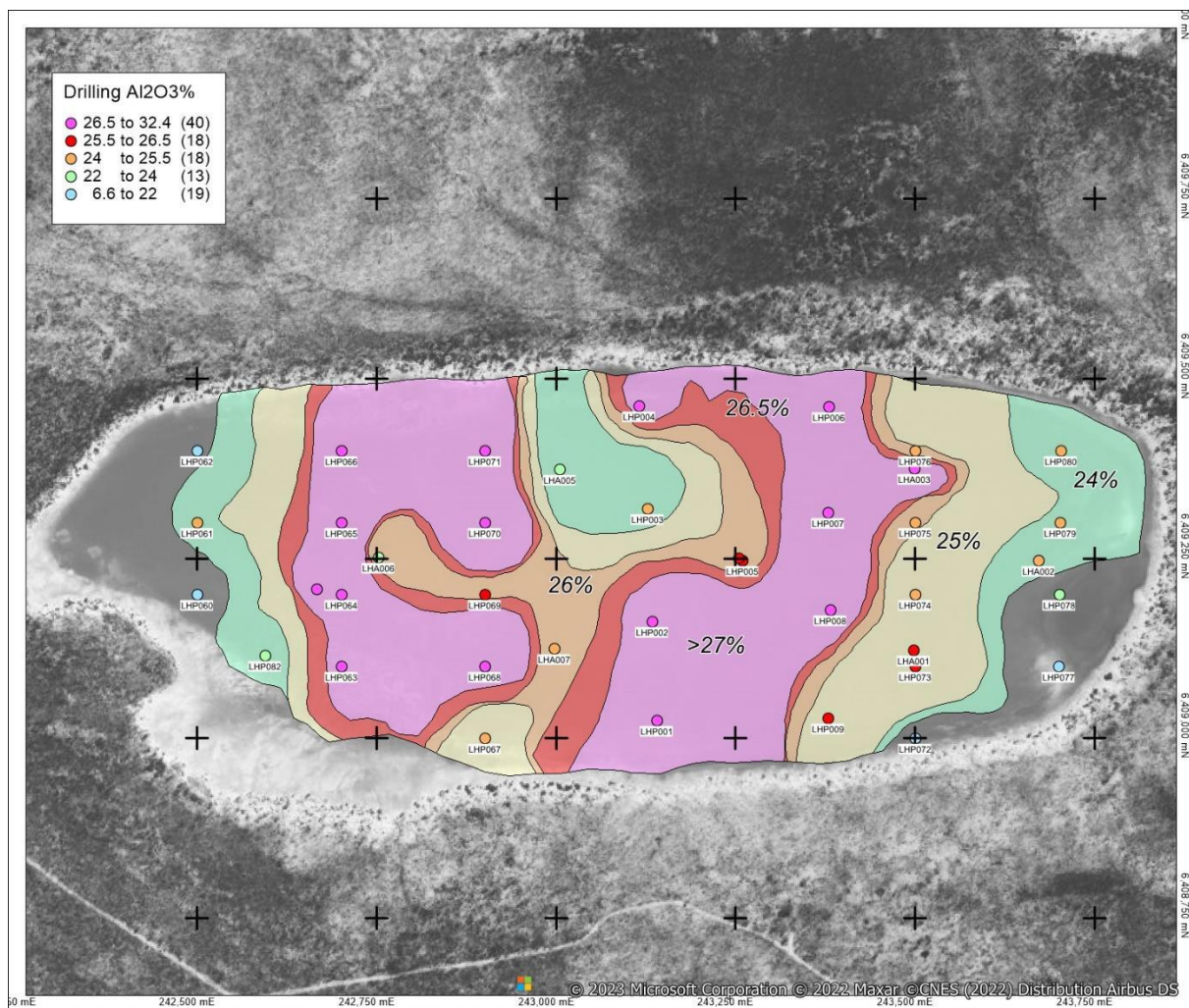


Figure 4. Drill results showing the average Al<sub>2</sub>O<sub>3</sub> grade for West Lake (top) and East Lake (bottom) at the same scale.

## Estimates Of Tonnes and Grade

An Exploration Target for alumina has been calculated for the mineralisation discovered thus far, highlighting Lake Hope's significant exploration potential.

### West Lake

1.65 million to 3.3 million tonnes at a grade of between 24.5%  $\text{Al}_2\text{O}_3$  and 27%  $\text{Al}_2\text{O}_3$ , containing between 403kt  $\text{Al}_2\text{O}_3$  and 895kt  $\text{Al}_2\text{O}_3$ .

### East Lake

0.93 million to 1.39 million tonnes at a grade of between 24%  $\text{Al}_2\text{O}_3$  and 26%  $\text{Al}_2\text{O}_3$ , containing between 223Kt  $\text{Al}_2\text{O}_3$  and 362Kt  $\text{Al}_2\text{O}_3$ .

### Total

2.59 million to 4.74 million tonnes at a grade of between 24.3%  $\text{Al}_2\text{O}_3$  and 26.7%  $\text{Al}_2\text{O}_3$  containing between 0.63Mt and 1.25Mt of  $\text{Al}_2\text{O}_3$ .

Table 1 highlights of the key statistics for the deposit.

Lake	Surface Area m <sup>2</sup>	Thickness	Tonnage Range		Al <sub>2</sub> O <sub>3</sub> Grade		Contained Alumina	
			Min	Max	Min	Max	Min	Max
West	1,300,000 m <sup>2</sup>	0.4 to 1 m	1,650,000 t	3,310,000 t	24.5%	27.0%	403,000 t	895,000 t
East	685,000 m <sup>2</sup>	0.4 to 2 m	930,000 t	1,390,000 t	24.0%	26.0%	289,000 t	360,000 t
Combined			2,590,000 t	4,740,000 t	24.3%	26.7%	629,000 t	1,250,000 t

Table 1. Lake Hope Exploration Target, 2022. Columns may not sum correctly due to rounding.

### EXPLORATION TARGET DISCLAIMER

*Investors should be aware that the potential size and grade of the alumina deposit at Lake Hope are conceptual in nature. Insufficient work has been undertaken to estimate a JORC 2012-compliant Mineral Resource Estimate, and it is uncertain if further exploration will result in the estimation of a Mineral Resource.*

## About the Exploration Target

The Exploration Target was calculated by gridding the drill results from each lake using a straightforward Inverse Distance Squared Function (IDW) with a 25 m x 25 m cell size and a search radius of 200m around the data points. The input data comprised composited length-weighted assays. The minimum thickness interval is 25 cm or is otherwise based on the thickness of the mud intersected.

The volume estimation was calculated via an isopach (thickness) grid constrained to known thickness only. Tonnage was calculated by multiplying the volume by the specific gravity. Specific gravity was measured via volumetric methods as 1.93g/cm<sup>3</sup>. Dry metric tonnage is estimated based on the average moisture content of 26.73%. Grade estimation was achieved by gridding the average grade of each hole into a 25 m x 25 m cell grid, with contained alumina calculated on the tonnage within the grid cell multiplied by the assay grade.

The minimum bound to the Exploration Target is constrained by the known thickness and extent of the mineralisation based on current drilling information.

The upper bound to the Exploration Target has been derived from assumptions about an increase in the thickness of the clay layers, which comes from ongoing drilling where the aluminium-rich clays are visually very obvious. In the north of the West Lake, there are visual indications of mineralisation at surface down to at least one metre below the surface. Given this, there is reasonable scope to double the thickness of portions of other parts of the West Lake clays from 0.6 metres to 1.2 metres and from 1.0 metres to 2.0 metres in parts of the East Lake.

Further work is currently underway to convert the Exploration Target into a Mineral Resource Estimate. This work includes additional drilling to establish the true thickness of the aluminous mud, an increase in the drill density from 200 m by 100 m to at least 100 m x 100 m, further measurements of the bulk density and accurate topographic control via DGPS survey.

## Metallurgy

Playa One has developed a novel, relatively low-cost hydro-metallurgical process to convert mineralisation of a type as found on Lake Hope into HPA with the potential to produce a purity exceeding 99.99% (4N HPA), generally taken as the industry standard purity for product comparison.

Initial bench-scale metallurgical test work on representative material, process design, flow sheet design and process engineering studies have been completed, leading to significant breakthroughs in mineral processing technology, including proprietary technologies.

Impact's review of this novel process indicates that together with the unique physical and chemical characteristics of the Lake Hope clays, using the Play One metallurgical process may offer a breakthrough in HPA production with potentially significant cost advantages compared to the processing of kaolin, commonly proposed as a source of ore for HPA and is the subject of several ongoing studies by other companies.

These advantages include the following:

- the naturally occurring micron-sized particles and relatively homogeneous ore require no comminution, grinding, classification, or wet-dry screening.
- a simple wash and filtration circuit for upfront processing.
- a low-temperature sulphuric acid leach, a generally readily available and cheaper acid than others.
- Eliminating the front-end energy-intensive calcination required in the kaolin process, thus significantly reducing energy costs, the flow sheet complexity and CO<sub>2</sub> emissions.
- Relatively benign waste products.

Optimisation of the processing flow sheet will be a key focus of the Pre-Feasibility Study (PFS).

The expected relatively low cost of mining also allows for significant optionality for the location of the metallurgical plant, which is likely to be located in one of four main population centres (Figure 1).

### Preliminary Economic Considerations

Playa One has completed a high-level review of the mining and chemical processing costs associated with a preferred development concept of the lake clay-sulphate process.

Impact has reviewed this concept in detail and has concluded that it represents a possible compelling path forward to production with the potential to be cost-competitive with existing and proposed HPA operations within Australia and internationally.

Impact is completing the work required to produce a Scoping Study to confirm Playa One's review. This will include the maiden Mineral Resource Estimate.

A logistics option study identified Kwinana, Albany, Esperance and Kalgoorlie as possible locations for a processing plant. They are all roughly equidistant from Lake Hope and easily accessible via road, rail, and ports for reagent supply and product export (Figure 1).

The unique geological properties of the Lake Hope deposit mean that trucking and mining costs are likely to comprise a small percentage of the overall operating cost estimate, with the clay to be trucked via conventional road trains to the processing facility.

### About High Purity Alumina and the market for its products

High Purity Alumina is aluminium oxide ("alumina" - Al<sub>2</sub>O<sub>3</sub>) with a generally accepted purity that exceeds 99.99%, or "4N" (four nines).

HPA has superior physical and chemical properties, such as high brightness, superior hardness, and superior corrosion resistance. It has traditionally found applications in:

- LED bulbs are a growth market for HPA as they substantially replace incandescent lighting systems because they are sustainable, durable, and safe.
- Protective coatings (in powdered form) as an inert, incombustible and non-conductive ceramic filler in electronics applications.



- Anode-cathode coatings and separators in lithium-ion batteries.
- Phosphor substrate material in plasma displays.
- Semiconductor substrates.
- A precursor for sapphire glass, optical lenses and specialty ceramics used in high-technology imaging and bio-medical devices.
- Defence and protective uses as a hard, chemically resistant and inert barrier.

In addition to the HPA, the final calcined ceramic form of the mineral, various precursor aluminium salts, including sulphates, nitrates, chlorides, and silicates (clays), also have essential end-market uses.

### Market Forecast for HPA: demand and price

The consensus amongst analysts and the industry is for 4N HPA and related products to command prices between US\$15,000 and US\$32,000 per tonne, with a median conservative price assumption of US\$20,000 per tonne. These figures are borne out by ongoing sales of small quantities of HPA and precursor products reported by Alpha HPA Limited (ASX: A4N Release 24<sup>th</sup> February 2023).

Although data are scarce, in-house analysis of industry performance indicates a notional cost curve with the bulk of incumbent producers at US\$11,000 to US\$15,000 per tonne for 4N HPA. New entrants, such as Alpha HPA Limited, who produce HPA from a chemical feedstock, and the kaolin developers are forecasting production at a disruptive cost of US\$6,000 to \$7,000 per tonne (Figure 8: ASX: A4N Release 7th February 2023 and 17<sup>th</sup> March 2020).

A preliminary review of the economic factors affecting the development of Lake Hope indicates that the Project may be cost-competitive with these new hydrometallurgical processes.

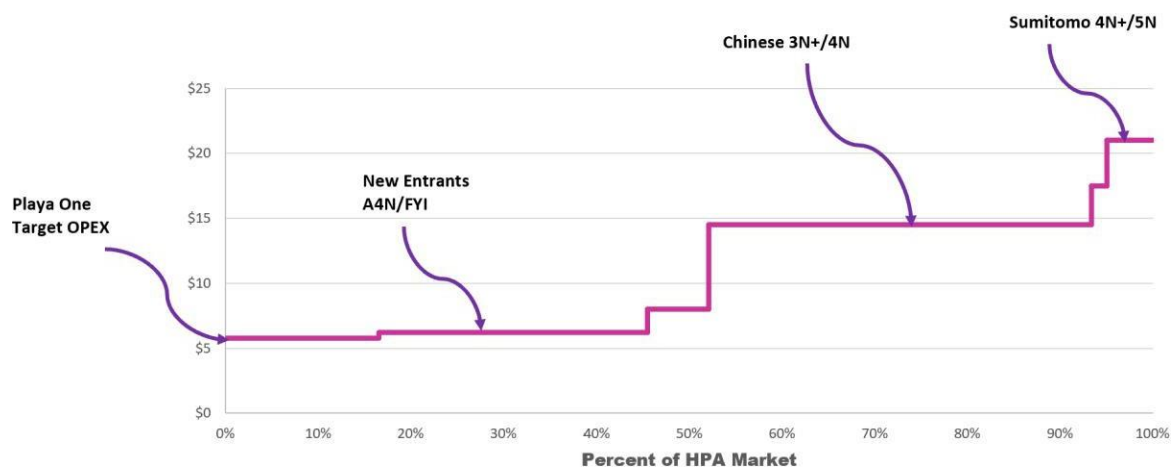


Figure 5. An indicative cost curve for global HPA production. Note the disruptive nature of the cost of production for new entrants using hydrometallurgical techniques versus the incumbent processes dominated by the Bayer process.

Overall annual demand for HPA is predicted to increase from 45,000 to 50,000 tonnes in 2021-22 to about 250,000 tonnes by 2030 (ASX Release March 21 2023).

An increase in LED demand will mainly drive this growth together with lithium-ion battery uses, both underpinned by global decarbonisation and electrification initiatives.

LED growth has experienced between 13% and 18% Compound Annual Growth Rate (CAGR) over the past ten years, and this is predicted to continue, driven by increased installation capacity of LED's and increased demand for environmentally friendly lighting in domestic and commercial properties.

The fastest-growing end-use demand sector in recent years has been in lithium battery separators, which grew at a CAGR of 26%, reaching 5,000 tonnes in 2018. Continued significant growth is predicted in this market, given the uptake of lithium battery technology.

Demand for sapphire glass, although accounting for a relatively small share of the overall market, is also growing at 8% to 10% CAGR. Sapphire glass has precise input tolerances, and a small number of market participants dominates production.

In addition, as noted above, other uses for Ultra High Purity precursors are also likely to be realised in the coming years.

In Asia-Pacific, government funding has fuelled the manufacturing capacity investments for electronic companies, which in turn is expected to fuel the demand for HPA over the next decade.

### Key Terms of the Playa One Acquisition

Impact may earn an interest in the Lake Hope Project, which is owned by Playa One Pty Ltd, in stages according to the following terms:

1. Impact to make a \$25,000 cash payment for a six-week option to complete due diligence.
2. If satisfied with due diligence, Impact will exercise the option and earn the right to sole fund a Pre-Feasibility Study (PFS) by paying \$175,000 cash, issuing 50 million fully paid ordinary shares (escrowed for 12 months), and issuing 30 million unlisted options exercisable at 1.125c, vesting 12 months from the date of issue and expiring on 1 December 2025, to the shareholders of Playa One.
3. Upon completion of a PFS, Impact can enter an incorporated joint venture with the Playa One shareholders (through an entity representing them, Playa Two Pty Ltd). If so, it will acquire an immediate 80% interest in Playa One by issuing up to 120 million fully paid ordinary shares capped at a maximum value of \$8 million (based on the 5-day VWAP before the election) to the Playa One Shareholders.
4. Upon completion of a Definitive Feasibility Study to be sole-funded by Impact, Impact will issue up to 100 million fully paid ordinary shares capped at a maximum value of \$10 million (based on the 5-day VWAP before the ASX announcement of the completion of the DFS) to the Playa One Shareholders.

5. Playa One shareholders will be free-carried to a Decision to Mine. Impact will maintain all Playa One tenements in good standing during this time.
6. If a Decision to Mine is made, the Playa One Shareholders may contribute to mine development costs or be diluted. If their interest falls below 7.5%, it will convert to a 2% net smelter royalty.

## Summary and Next Steps

The unique nature of the Lake Hope deposit, which allows for very low cost, low environmental footprint free-dig mining, combined with straightforward metallurgical processing, presents a clear path to producing high purity alumina products that command high margins in a global market forecast to expand over the next decade dramatically.

As such, the Lake Hope Project presents a compelling opportunity for Impact Minerals and its shareholders. The company will move towards production as quickly as practicable over the next few years.

The Lake Hope Project will become the main focus of Impact's activities going forward. The PFS and DFS are estimated to cost about \$2.5 million over the next two years.

This relatively low cost for feasibility studies compared to other more conventional projects will allow exploration to continue at Impact's other projects, in particular the Arkun project in the emerging mineral province of southwest Western Australia.

In addition, work will also continue at Broken Hill under the BHP Xplor programme (ASX Release January 17<sup>th</sup> 2023). Statutory commitments are also expected to be maintained on the company's other projects.

Authorised by the Board of Impact Minerals Limited



Dr Michael G Jones

Managing Director

### **Competent Person's Statement**

#### **Exploration Results**

*The review of exploration activities and results, the Exploration Target and the metallurgical test work contained in this report is based on information compiled by Roland Gotthard, a Member of the Australian Institute of Mining and Metallurgists. He is an employee of Impact Minerals Limited. He has sufficient experience which is relevant to the style of mineralisation and types of deposits under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code). Mr. Gotthard has consented to the inclusion in the report of the matters based on his information in the form and context in which it appears.*

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