

September 15, 2022

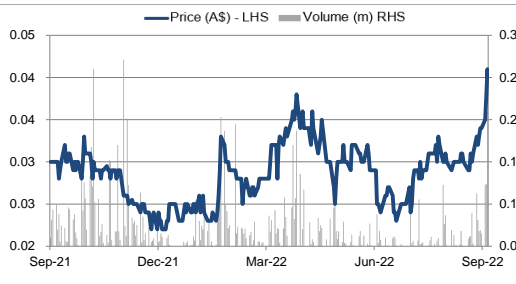
EMERGING COMPANY
SPECULATIVE BUY

Stock code:	MLM AU
Price:	A\$0.04
12-month target price:	A\$0.15
Previous target price:	A\$N/A
Up/downside to target price:	275.0%
Dividend yield:	0.0%
12-month TSR*:	275.0%
Market cap:	A\$27m
Average daily turnover:	0.02m
Index inclusion:	N/A

* Total stock return – Up/downside to target price + 12-month forward dividend yield.

Price performance

(%)	1M	3M	12M	3Y
Absolute	33.3	63.3	33.3	250.0
Rel ASX/S&P200	34.2	58.4	38.9	244.9



Source: Bloomberg

Board

Theo Psaros, Executive Chairman
Brad Sampson, Non-Executive Director
Mark Bojanjac, Non-Executive Director

Substantial shareholders

Ilwella Pty Ltd: 22.5%
Sparta AG: 9.6%
Dostal Nominees: 6.0%
Sibelco Asia Pacific: 1.1%
Source: Company data, Morgans estimates

Kyle Williams

+61 7 3334 4991
kyle.williams@morgans.com.au

Analyst(s) own shares in the following stocks mentioned in this report:
– N/A

Metallica Minerals

Cape Flattery: Capturing Asia’s silica sand demand

- Metallica Minerals (MLM:ASX) is focused on developing its flagship asset, the 100% owned Cape Flattery Silica Sand Project (CFS) in Northern Queensland.
- MLM is well positioned to be a feeder of high purity silica to the steadily growing Asia-Pacific market.
- MLM’s CFS Project borders the world-renowned Cape Flattery Silica Mine, operated by the Mitsubishi Corporation. The mine has exported high purity silica sand to Japan and other Asian countries since 1967.
- We initiate coverage of MLM with a Speculative Buy rating and A\$0.15 target price.

Cape Flattery Silica Project snapshot

- MLM released a Pre-Feasibility Study (PFS) in March 2022 and a Maiden Ore Reserve for its Cape Flattery Silica Sand Project (CFS). The MLM Study outlined robust economics including a post-tax NPV8 of A\$189m, IRR of 27.1% and life of project cash revenue of A\$2,127m.
- Maiden Ore Reserve of 46 million tonnes (Mt) @ 99.18% SiO₂ supports a 25 year Project life producing 1.35Mtpa of saleable silica sand product.
- In August 2022, MLM signed a Memorandum of Understanding (MOU) with Mitsui & Co to evaluate the possibility of a sale and purchase transaction (off-take transaction) of silica sand from the CFS Project.
- JukesTodd was recently appointed as Study Manager for the Definitive Feasibility Study (DFS).
- First Silica Sand production from the Cape Flattery Project forecast for H1 CY25.

2022 PFS highlights strong project economics

- The Cape Flattery Silica PFS confirms a 25 year mine life and a ROM production rate of 1.8mtpa, producing 1.35Mt of saleable product per annum. Initial construction capex is estimated at \$79.4m, returning an annual average EBITDA of \$38m. The PFS outlined a simple mining and processing method, applying well developed industry practice and ensures the project is sustainable on economic, environmental and social terms.

Valuation

- We use the key mining processing metrics and financial assumptions from the March 2022 PFS to support our DCF valuation methodology. We have assumed a 50/50 debt to equity funding scenario for the CFS Project and we apply a discount to consider permitting and development risk for the CFS Project. We form a risked valuation of \$0.15/share and a Speculative Buy rating.

Investment view: Capturing Asia Pacific demand for high purity silica sand

- Silica sands are essential raw materials for glassmaking and a wide range of industrial applications.
- Recent demand growth for high purity silica in Asia has been underpinned by China’s rapidly growing solar photovoltaic (PV) manufacturing industry. Global demand for silica sand is being driven by population growth, accelerating electrification and transition to greener technologies, particularly solar energy.
- The suitability of a Cape Flattery high-grade silica sand product covers a range of sectors including foundry, flat and architectural glass but given its naturally occurring low Fe₂O₃ content, it is ideally suitable for photovoltaic (PV) solar glass.

Price catalysts

- Definitive Feasibility Study (DFS) due Q2 CY2023.
- Results from the exploration auger drilling at the Western Area of tenement EPF25734 (west of the CFS Project Resource Area) are expected in the coming months. First silica sand production from the Cape Flattery Project forecast for early H1 CY2025.

Risks

- Development financing - The ability to secure debt and equity financing for the CFS Project.
- Regulatory Approvals - Delays to environmental, water, native title and mining approvals.

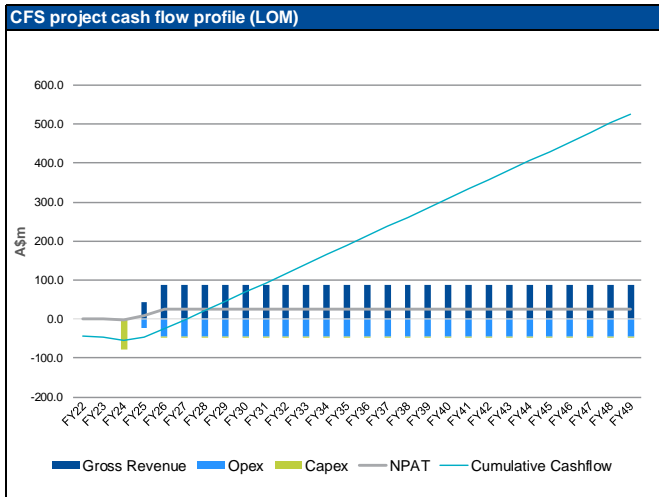
Metallica Minerals

SPECULATIVE BUY

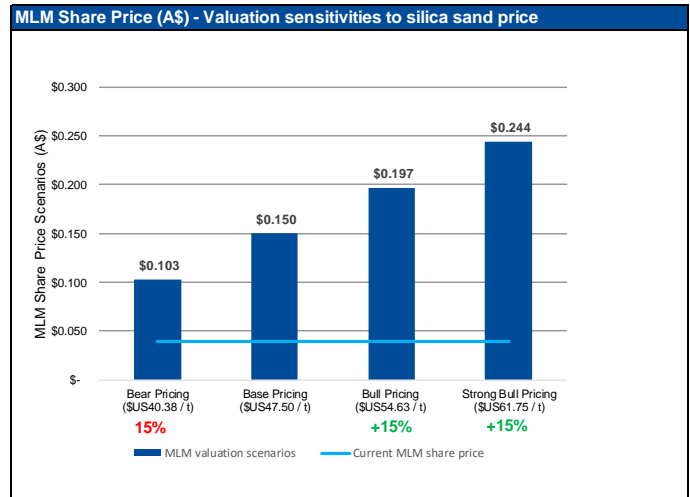
as at September 15, 2022

Price (A\$):	0.04	12-month target price (A\$):	0.15
Market cap (A\$m):	27	Up/downside to target price (%):	275.0
Free float (%):	52	Dividend yield (%):	0.0
Index inclusion:	N/A	12-month TSR (%):	275.0

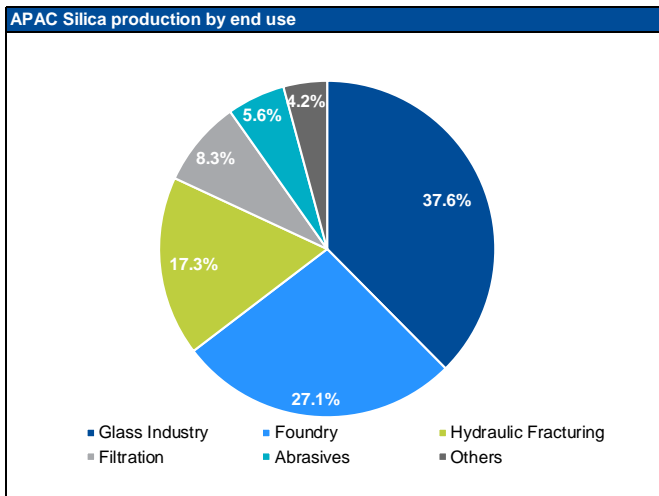
Metallica Minerals (ASX: MLM) is a resource development company with interests in several north Queensland mining projects. MLM wholly owns its flagship Cape Flattery Silica Sands (CFS) project, situated some 200km north of Cairns, which contains a 46Mt Ore Reserve at a grade of 99.18% SiO2 to JORC Code 2012 Standard.



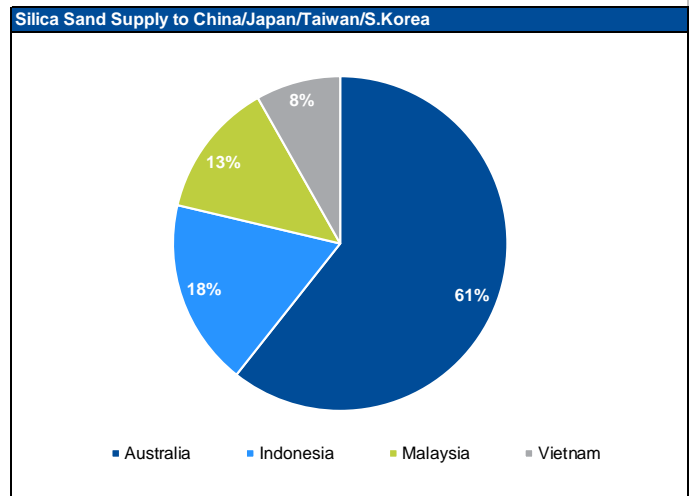
SOURCE: MORGANS, COMPANY



SOURCE: MORGANS, COMPANY



SOURCE: COMPANY, ITA




SOURCE: PRIME GAIN, COMPANY

Silica Sand - Key Applications

Industries / End use

- Glass
- Foundry
- Solar panel Ceramic
- Paint, petro-chemicals
- Abrasives
- Cement
- Hydraulic fracturing



High purity silica sand applications for renewable energy

- "New economy" mineral and critical in the development of global renewable energy
- key component in solar panels and acts as a semiconductor.
- Silica offers high corrosion resistance, long-term durability, good photoconductivity and low toxicity.

Cape Flattery Silica Project - Capturing Asia's demand for high purity silica sand

- CFS silica sand product covers a range of sectors including foundry, flat and architectural glass, and photovoltaic (PV) solar glass.
- Metallica's Cape Flattery silica sand is potentially suitable for ultra-clear glass used in high-tech applications such as solar panels, smart phones, fibre-optics, TV flat screens and LED lights.
- CFS Project is located in a tier 1 jurisdiction, in close proximity to key markets.

SOURCE: MORGANS, COMPANY

Key Risks & Drivers

Industry drivers

- Rapid growth of solar panel manufacturing in Asia.
- Rising demand for energy efficient windows.
- Strong demand for fabricated flat glass products.
- Expanding applications of glass in healthcare and electronics sectors.
- IMARC estimated the global silica sand market could grow from US\$7B to US\$20B in 2024.
- Net-zero emission targets rely heavily on solar power as a supply source.

Investment risks

- Key Approvals - environmental, water access, native title, and mining licence.
- Development Funding- Ability to secure debt and equity financing for the CFS Project.
- High inflationary environment - potential increase to pre-development capital cost.
- Ongoing COVID-19 supply chain impacts - potential for delays to proposed mine start
- Commodity price and foreign exchange risk.
- Operating Risks - metallurgy and mining carries inherent risk for any mining company.

Upcoming catalysts

- Results from the 25-hole auger program at the western exploration targets
- Government approval lodgments covering environmental, rehabilitation and closure plan and water licence.
- Results from variability test work from areas of the CFS Ore Reserve - Potential for further MOU and offtake agreements.
- Definitive Feasibility Study (DFS) due Q2 CY2023.

SOURCE: MORGANS, ITA, COMPANY

Valuation and assumptions

We have based our valuation for MLM on a DCF analysis of the Cape Flattery Silica Project and applied the key financial assumptions and technical parameters outlined in the March 2022 PFS. The study contains a comprehensive mining schedule, process flowsheet and cost estimates. MLM engaged Prime Gain, a Hong Kong-based marketing consultant. Prime Gain advised that “a high-grade Cape Flattery silica sand product could reasonably achieve FOB pricing of A\$55.56 to A\$75.00 per tonne, subject to various market conditions and variables”.

We apply a base case silica sand price of A\$63.63/t (US\$47.50/t) over our modelled 25-year mine life and we apply a C1 OpEx cost of A\$33.8/t product. We have used a 10% discount rate on our 12-month valuation outlook – typical for development stage companies. Our model assumes a 50/50 debt to equity funding scenario for the CFS Project, based on the construction Capex of A\$79.4m. On a per share basis, we have diluted for an assumed equity raise before Q4 CY2023 of A\$39.7m (\$0.12/share), implying ~1.0bn shares (currently 670.7m on issue).

Figure 2: Morgans key model assumptions

Morgans Key Model Assumptions	CFS Project
Construction Capex	\$A79.4m
Mine Life	25 years
Ore Reserve	46Mt @ 99.18% SiO ₂
LOM sand mined and processed	46Mt
Silica Sand Sales	33.4Mt
Nameplate Plant Operating Capacity	1.8Mtpa
Mined silica sand grade	99.18%
Silica sand recovery (plant recovery)	75%
Silica Sand Product sold	1.35Mtpa
AUD/USD exchange	\$US0.74
Corporate Tax Rate	30%
Silica Sand Flat Price (FOB)	A\$63.63/t / US\$47.50/t
Queensland Government royalty (product)	A\$0.90/t
Discount Rate (WACC)	10%
Total Risk Applied to CFS Project	20%
C1 Opex cost	\$A33.8/t product
AISC	\$A35.7/t product

Source: Morgans estimates, company data

Figure 3: Morgans sum of the parts valuation

Morgans Valuation Summary	A\$m	Risk Discount	Risked Valuation A\$m	A\$/share
CFS Project	\$ 125.17	20%	\$ 100.13	\$ 0.100
CFS Additional Resource	\$ 15.00		\$ 15.00	\$ 0.015
Exploration & Other Projects	\$ 5.00		\$ 5.00	\$ 0.005
Net Cash	\$ 5.26		\$ 5.26	\$ 0.005
Corporate	\$ (14.89)		\$ (14.89)	\$ (0.015)
Future Equity Raised (at \$0.12/sh)	\$ 39.70		\$ 39.70	\$ 0.040
Sub total	\$ 175.23		\$ 150.20	\$ 0.150
Discount Rate				10%
Target Price				\$ 0.150

Source: Morgans estimates, company data

The CFS Project returns an unrisks post-tax NPV₈ of \$169m based on our DCF model

We apply the key assumptions from the March 2022 PFS and we include a 50/50 debt to equity funding scenario

We apply a silica sand product price of \$63.63/t – from the March 2022 PFS

We use a more conservative 10% discount rate to return an unrisks post-tax NPV₁₀ of ~\$175m for the CFS Project scenario

We apply a 20% risk weighting for the CFS Project to account for development and permitting risk

We attain a risked valuation of ~\$150m, or \$0.15/share

Key sensitivities to our valuation relate to the silica price and the discount rate which can be seen in Figure 4 (below). When applying a 15% increase (A\$54.63/t) to our base case silica sand price, and a 10% WACC, the valuation increases to ~\$0.20/share.

Figure 4: MLM share price sensitivity analysis to silica sand pricing and discount rate

We achieve a base case valuation for MLM of \$0.15/share (US\$47.50/t), and a bull case valuation of ~\$0.20/share (US\$54.63/t)

		Silica Sand Price (US\$/tonne product)				
		33.25	40.38	47.50	54.63	61.75
Discount Rate (WACC)	12%	0.049	0.088	0.126	0.165	0.203
	11%	0.052	0.095	0.137	0.180	0.222
	10%	0.055	0.103	0.150	0.197	0.244
	9%	0.060	0.112	0.165	0.218	0.270
	8%	0.064	0.124	0.183	0.242	0.300

Source: Morgans estimates, company data

Note: All figures are in A\$ and rounded to 2 decimal places

In late August 2022, Metallica Minerals signed an MOU with Mitsui & Co to assess the potential for an off-take transaction of silica sand from CFS

Recent company developments

- On 30 August 2022, Metallica Minerals announced it had signed a Memorandum of Understanding (MOU) with Mitsui & Co to evaluate the possibility of a sale and purchase transaction (off-take transaction) of silica sand from the CFS Project.
- Sibelco Asia Pacific has entered the register through an on market share purchase. Sibelco currently holds ~1.1% of the register. Sibelco is a global material solutions company focused on mining, processing and selling industrial minerals.
- Industry renowned Project Manager JukesTodd recently appointed as Study Manager for the Definitive Feasibility Study (DFS). JukesTodd has been selected as Integrated Delivery Partner to provide commercial and technical advisory for the DFS.

CFS Project - Key bull points

- Steady demand growth for Silica Sand – According to IMARC, Asia’s demand for silica sand has been growing at a compound annual growth rate (CAGR) of 9.1% over the past five years, led by China.
- Management team led by industry experts with strong operational experience in open pit operations in Queensland. The team has extensive project management experience, covering environmental and native title negotiations.
- Located near major glass manufacturers and downstream industrial processing facilities in Asia.
- Large 25-year life Project life based on a large and high quality silica sand resource of 46 million tonnes @ 99.18% SiO₂ producing saleable product of 1.35Mt per annum.
- The Cape Flattery Silica PFS outlines a 1.8mtpa ROM rate operation, producing 1.35mtpa of saleable silica product, over a 25 year Life of Mine (LOM). The PFS estimates a post-tax NPV8 of \$189.3m and 27.1% IRR for a LOM EBITDA of \$952m.
- Simple, free digging mining operation utilises a relatively small fleet of heavy machinery. Ore processing is relatively simple and well understood.
- Low environmental impact underpinned by a progressive rehabilitation process after sand extraction.

The CFS Project is located in a tier 1 jurisdiction, with the ability to supply the steadily growing Asia-Pacific demand for Silica Sand

CFS Project - Key risks

We consider the key risks toward development being regulatory approvals from key state and federal government applications

- **Regulatory approvals** - Delays or rejections for approvals including environmental, native title, water licence, and final mining approval.
- **Operating risks** - The team has completed preliminary metallurgical studies however further test work is underway to understand the silica sand variability in respect to final processing plant design. During operation there is potential for lower than estimated recovery through the processing plant. An increase in operational costs could reduce the profitability of the operation and therefore negatively affect our valuation.
- **Increased supply** - Increased output from existing and new producers and projects currently progressing through project development and approvals programs.
- **Inflation and costs** - Ongoing supply chain challenges continue to affect mining operations globally. Significant cost increases in freight charges, diesel and labour may continue to persist in the coming years.
- **Commodity price and foreign exchange risk** - Any adverse silica sand pricing movements could affect the profitability of the CFS operation and therefore negatively impact our valuation.
- **Development funding** - The ability to secure debt and equity financing for the CFS Project. We have made assumptions regarding the amount and cost of funding in our analysis. Our assumptions are subject to equity market risk and credit availability.
- **Offtake agreements** - Metallica has received interest from a number of potential offtake parties who have expressed a need to secure a high-purity silica sand product. Metallica is currently undertaking variability test work from a range of locations within the Ore Reserve with an aim to achieve a level of Fe₂O₃ of less than or equal to 120ppm.

To achieve premium silica sand prices, a consistent product containing ≤120ppm Fe₂O₃ is the industry benchmark

Key federal and state government applications will be submitted in H2 CY2022

Results from the exploration auger drilling at the Western Area of the tenement are expected in the coming months

Key work streams rapidly progressing

- Continue environmental studies and field work, leading to the lodgment of the site specific Environmental Application in Q3 CY2022.
- Progressive Rehabilitation and Closure Plan (PRCP) to be lodged with the DES in Q3 CY2022.
- A Development Application (DA) to the Queensland Government will be lodged in Q4 CY2022, for permission to construct a purpose-built jetty for the CFS Project. This infrastructure will be located within the Port Limit of Cape Flattery. The MOU signed in June 2022 is the first step towards formalising the commercial terms for the establishment of the purpose-built jetty for the CFS Project.
- Recent variability test work concentrated on the iron variability and final product specifications. Variability studies will aim to optimise the sand recovery sequence, forming an important part of the early DFS work. Results from metallurgical test work will feed into plant design and final product specifications due Q4 CY2022.
- Progress key agreements together with local Traditional Land Owners with an aim to conclude negotiations in Q4 CY2022.
- Lodge water licence application in Q4 CY2022 to the Department of Regional Development, Manufacturing & Water for the CFS project.
- Continue an assessment on the silica sand market and potential for establishing customer off-take agreements. MLM has previously announced potential offtake partners in established international silica sand markets continue to engage with the Company.

Cape Flattery Silica Sand Project

Overview and history

The CFS Project contains a large surface deposit of high grade quartz (silica) within an aeolian dune system

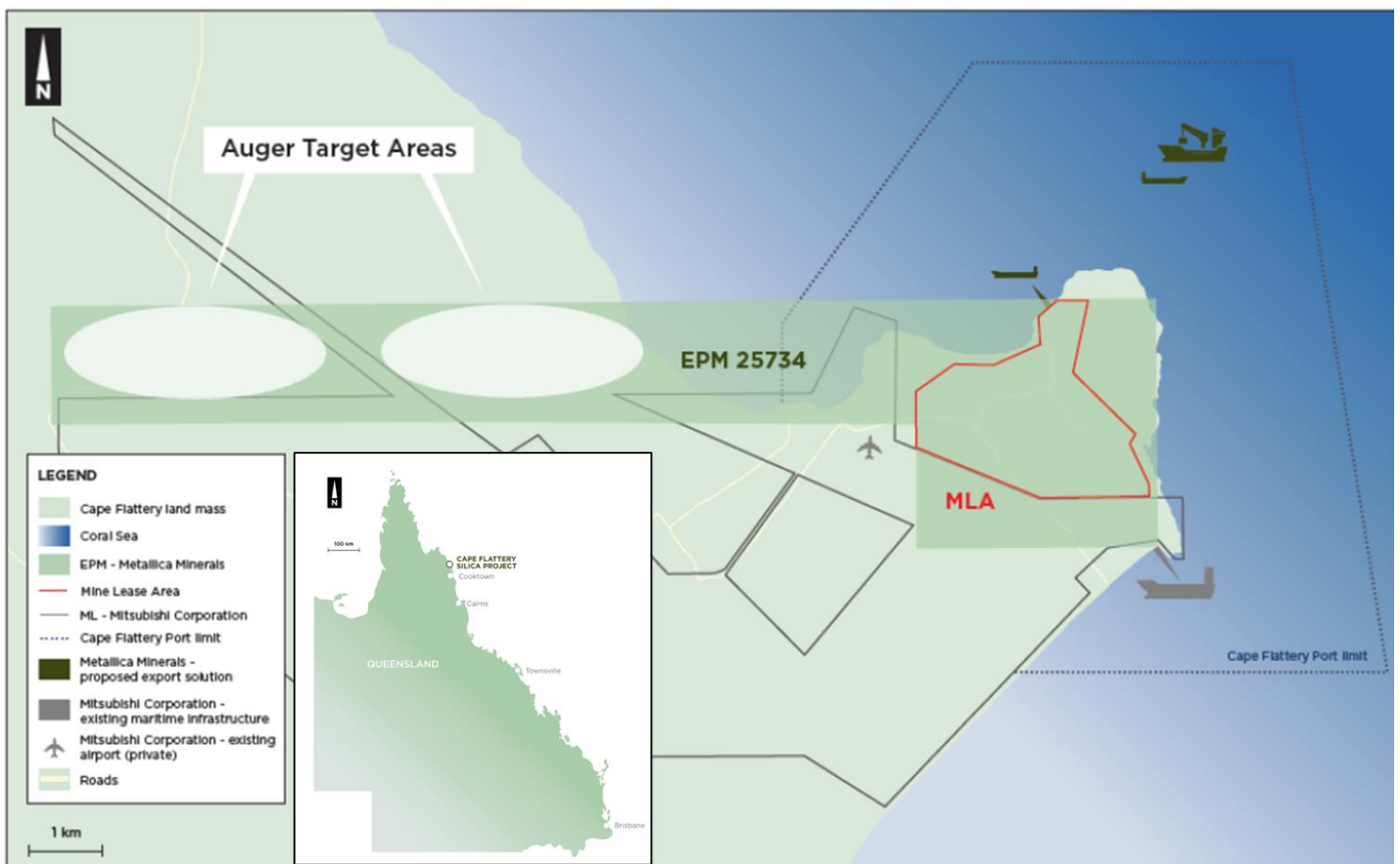
Metallica's 100% owned Cape Flattery Silica Sand (CFS) Project is located in the Cape Flattery area, on the eastern coastline of Cape York Peninsula, 220 km north of Cairns, and 55km from Cooktown. MLM is developing the CFS Project adjacent to the Cape Flattery Silica Sand mining and shipping operation owned by the Mitsubishi Corporation. Initial exploration drilling in late 2019 confirmed the presence of high purity silica sand within EPM 25734, which is understood to have comparable quality to Resources held and currently mined by Mitsubishi at their Cape Flattery Silica Mine.

The Cape Flattery Region is regarded internationally as a premium source of low-iron silica sand with exceptional particle size distribution

MLM proposes to extract and process raw sand to produce a silica sand product of suitable quality for the steadily growing solar photovoltaic (PV) market in Asia. The CFS Project is a large surface deposit of overlying sand dunes that lies in the northern most part of the Quaternary age Cape Flattery - Cape Bedford dunefield complex.

The mineralisation is high grade quartz (silica) and it occurs as sand deposits within an aeolian dune complex. The deposit is in a remote region, close to the surface with only a limited vegetation and topsoil covering. Based on these characteristics, the deposit is amenable to open-cut sand extraction methods.

Figure 5: Cape Flattery Silica Sand project location, dotted line outlines the Port Limit of Cape Flattery, operated by Ports North (State Gov.)



Source: MLM ASX August 2022 Presentation

CFS Project receives state government endorsement

The Project is important for the local Hope Vale and Cooktown communities, as it offers employment and training opportunities to local indigenous communities. In February 2022, the Queensland Department of Regional Development, Manufacturing and Water granted the CFS Project Regional Significance status. This decision represented an important milestone as the Project is now eligible to apply for a water entitlement from the Water Plan. There is currently 25,000 megalitres of unallocated water held in the strategic reserve for the Water Plan. MLM is aiming to submit an application to the Department of Regional Development, Manufacturing & Water for a Water Licence for the CFS project during Q4 CY22.

Transport Solution: CFS located inside the Port Limit

Metallica's CFS Project is located adjacent to Mitsubishi's silica sand mine, historically the largest exporter of high purity silica sand in the world, with approximately 3Mt of production annually. Mitsubishi's jetty is a single berth serviced by a travelling ship loader for the exporting of silica sand. An existing jetty operated by Mitsubishi is located on the southern side of Cape Flattery, however the facility is at capacity and not open for third party usage.

The key method of transporting silica sand off the mainland will be through a proposed jetty and barge loading facility (BLF), located within the Cape Flattery Port Area operated by Ports North. In June 2022 MLM announced it had executed a Memorandum of Understanding (MOU) with Ports North regarding a Development Approval (DA), to allow the establishment of a new jetty and BLF within the Cape Flattery Port boundary.

A purpose-built jetty is planned to be constructed (subject to DA) to allow barge loading and transshipping operations within the Port Limit of Cape Flattery. MLM intends to barge processed sand from the planned jetty and load ocean going vessels within the Port Limit.

Metallurgy: Preliminary tests achieve high-quality product

Metallica's CFS Project area is located immediately next to the Cape Flattery Silica mine run by Mitsubishi Co, which currently exports high purity silica sand to the Asian market. The exported sand is suitable for a number of applications including foundry, flat and architectural glass, and for photovoltaic (PV) solar glass.

In April 2022, Metallica reported positive results from preliminary metallurgical test work which utilised a sand characterisation study on three targeted samples at the CFS Project. This recent round of metallurgical test work highlighted that the Heavy Liquid Separation (HLS) stage of the process shows the most significant reduction in Fe_2O_3 , with the Fe_2O_3 content of the silica sand reduced from grades of 260 ppm Fe_2O_3 to between 70ppm and 100ppm.

The team is currently undertaking further metallurgical test work across other areas of the resource. This work aims to characterise the silica sand variability and the findings will feed into the final processing plant design and product specifications.

Strong engagement with traditional landowners

Management has held four meetings with the negotiation representatives of the clans who are the traditional landowners of the planned Mining Lease Application (MLA) area. The company has met with the Dingaal and Nguurruumungu representatives and their respective legal advisors and the negotiations are continuing. Metallica has developed a strong relationship with the traditional landowners through local community support and employment.

The CFS Project will utilise a barge loading and transshipping operation within the Port Limit of Cape Flattery

A preliminary sand characterisation study returned a high purity silica sand product (<120ppm Fe_2O_3)

The company has developed strong relationships with local traditional landowners and the communities in Hope Vale and Cooktown

Robust PFS economics supported by large JORC Ore Reserve

The Maiden Ore Probable Reserve of 46Mt @ 99.18% SiO₂ was announced in conjunction with the PFS in March 2022. The Measured and Indicated Resources were upgraded to Ore Reserve Status in accordance with the JORC Code (2012) Guidelines. The Mineral Reserve is based on extensive vacuum drilling campaigns in December 2020 and August 2021, with a relatively low footprint that covers an area of approximately 315ha. The sand dunes range in thickness from 2-36m, and average 12m through the reserve pit shell.

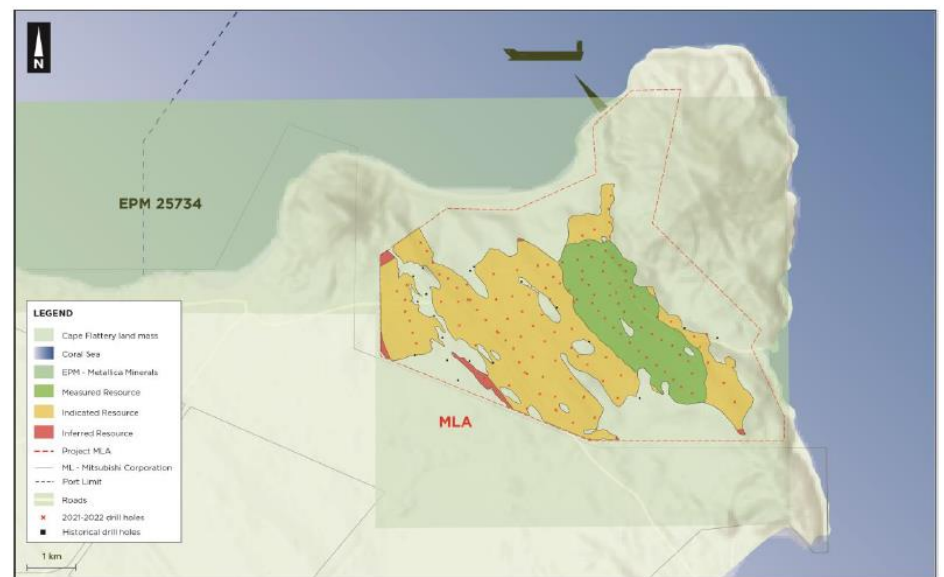
Figure 6: CFS Ore Reserve and Resource table (JORC 2012 Code)

Ore Reserve Category	Silica Sand (Mt)	SiO ₂ %	Fe ₂ O ₃ %	TiO ₂ %	Al ₂ O ₃ %	LOI %	Silica Sand (mm ³)	Density (t/m ³)
Probable Reserve	46	99.18	0.12	0.14	0.11	0.19	28.76	1.60

Resource Category	Silica Sand (Mt)	SiO ₂ %	Fe ₂ O ₃ %	TiO ₂ %	Al ₂ O ₃ %	LOI %	Silica Sand (mm ³)	Density (t/m ³)
Measured	16.7	99.29	0.10	0.13	0.08	0.17	10.40	1.60
Indicated	35.2	99.14	0.13	0.14	0.13	0.19	22.00	1.60
Inferred	0.3	99.06	0.14	0.12	0.16	0.23	0.20	1.60
Total	52.2	99.18	0.12	0.14	0.11	0.18	32.60	1.60

Source: Company data

Figure 7: CFS Project - Eastern Resource Area showing categories and drilling



Source: Company data

Simple free-dig sand extraction

Sand extraction is planned to commence in the northeast portion of the Measured Resource area near the mine infrastructure area, before progressing to the south and west (Figure 7). All production is based on the Maiden Ore Reserve of 46Mt.

Following vegetation clearing, topsoil will be removed across a small initial footprint using a dozer or grader with separation of the soil and sub-soil horizon to an average depth of 500mm. Topsoil is planned to be stockpiled in 2m high (maximum) piles at the boundary of the clearing area to be used for progressive rehabilitation which will be undertaken progressively throughout the life of the project.

The CFS Project contains a large 46Mt Ore Reserve defined to JORC 2012 Standard

CFS mining area is located in close proximity to planned port infrastructure and processing facility

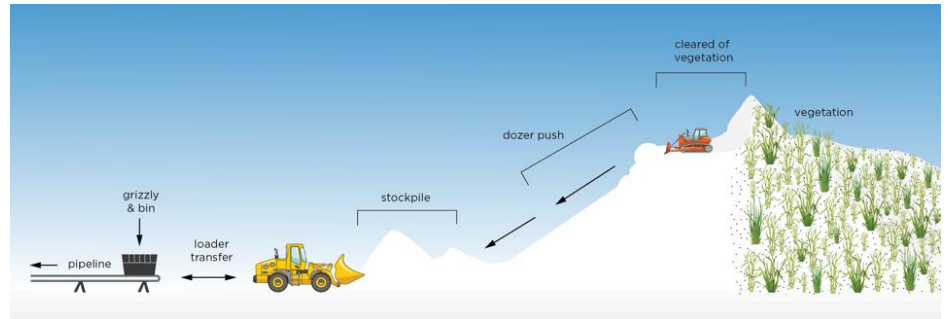
The team is currently undertaking an auger drilling program on the western dune system located in EPM25734

The CFS deposit is amenable to simple open-cut sand extraction methods

Following removal of the topsoil, silica sand extraction can commence with direct loading from the working face by a wheel loader. The loader will load silica sand into a mobile feeder unit (Figure 8).

Figure 8: Sand extraction mining process – simplified drawing

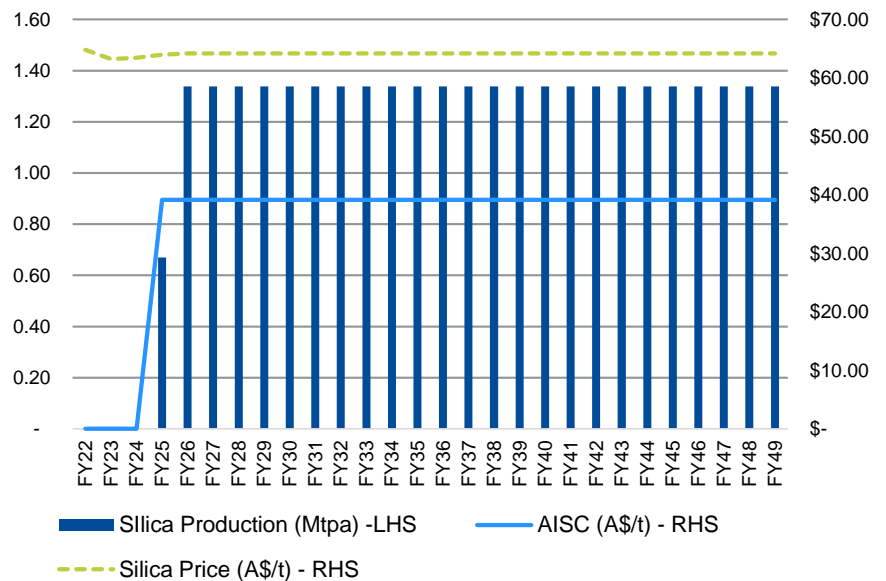
A mobile feed unit at the sand extraction face consists of a grizzly, screen, slurry tank and pump. Poly pipes are then used to pump material to the infrastructure area where it is fed into the processing plant



Source: Company data

Figure 9: Modelled production and AISC profile – CFS Project

We estimate the CFS Project to achieve steady-state production in mid CY25



Source: Morgans estimates, Company data

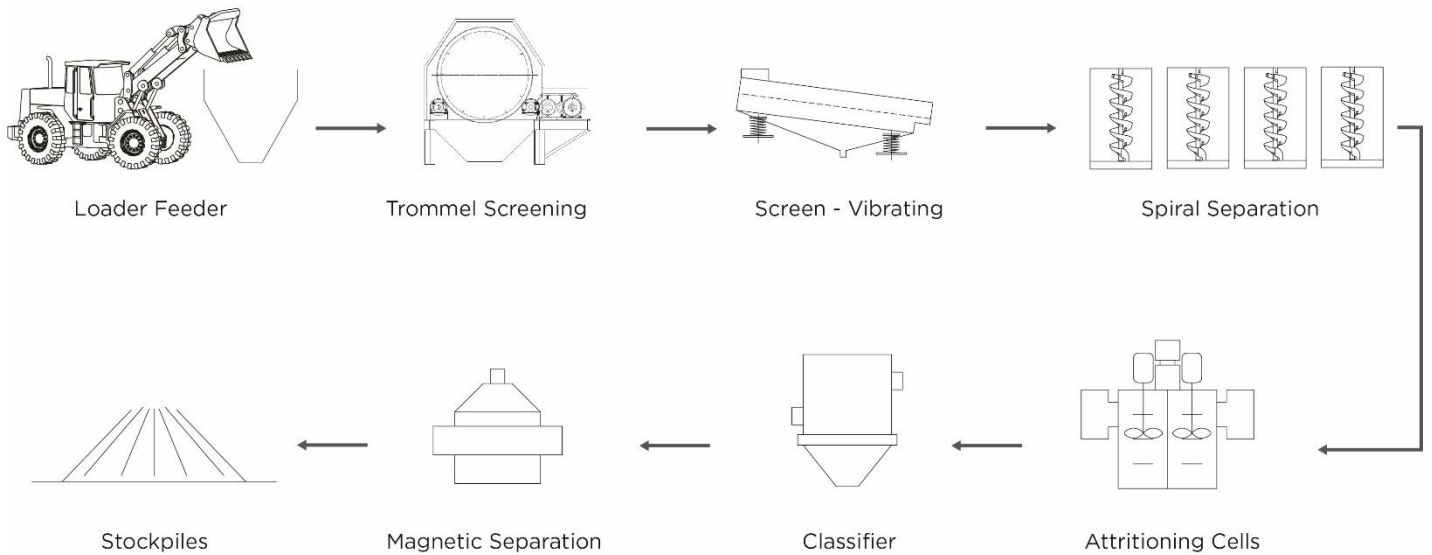
Processing

No chemicals are used during the processing stage, underpinning an ESG friendly operation

The CFS Project utilises a Wet Concentration Plant (WCP) for processing the silica sand. The plant is designed to refine the sand to reduce heavy minerals, Fe_2O_3 and Al_2O_3 contaminants. It is located to the northeast of the sand extraction area, near to the Barge Loading Facility. No chemicals are added to the sand as it is processed through the WCP and therefore no tailings are produced. Reject material from the WCP will contain low-grade silica sand including Fe_2O_3 and Al_2O_3 . The rejects will be pumped back to the active rehabilitation faces to progressively rehabilitate the extraction area.

Figure 10 details the key processing stages to produce the silica sand end product.

Figure 10: CFS Project – Schematic diagram outlining the processing flowsheet

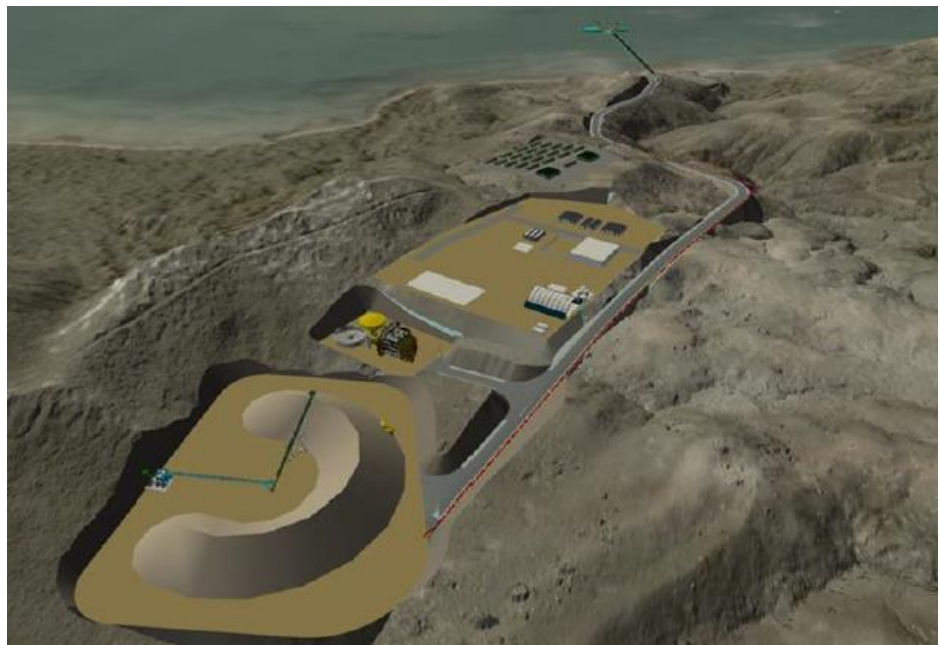


Source: Company data

Figure 11: Conceptual design of the processing facility, jetty and camp

Key infrastructure includes the product stockpile, processing plant, conveyor, jetty infrastructure and accommodation facility

The company is studying renewable energy options such as wind power to supplement a diesel generator system



Source: MLM August ASX Presentation

Silica Sand: Market Analysis

CFS Silica sand product - wide ranging applications

Silica sand has a wide range of uses including glassmaking, foundry casting, water filtration, chemicals and metals, hydraulic fracturing and an increasing number of high-tech products, including solar panels. It has advantageous properties such as strength, as well as resistance to heat and chemical reactions.

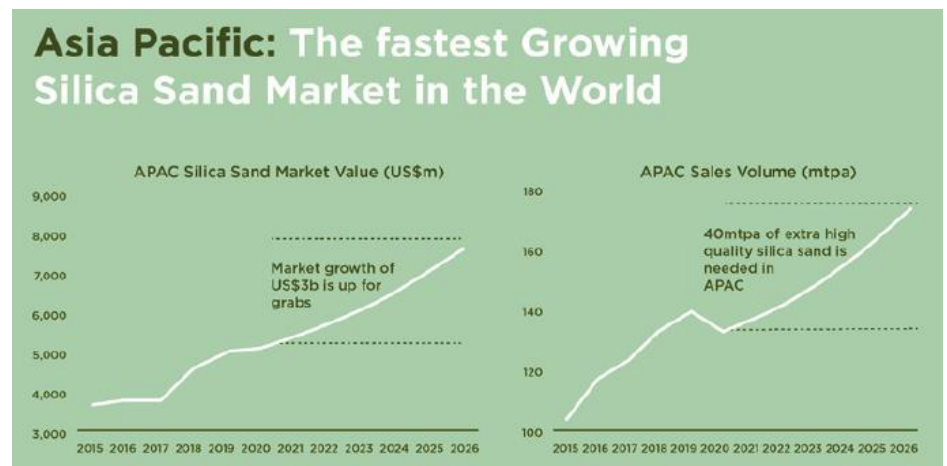
The suitability of a Cape Flattery high-grade silica sand product covers a range of sectors including foundry, flat and architectural glass but given its naturally occurring low Fe₂O₃ content, it is highly suitable for photovoltaic (PV) solar glass.

Asia Pacific silica sand market

In Asia, demand for silica sand has been growing at a compound annual growth rate (CAGR) of 9.1% over the past five years, led by China. China's demand for silica sand has been growing at a CAGR of 41.1% over the same period. Solar panels require photovoltaic (PV) glass — of which high-grade silica sand is a key raw material.

IMARC expects the silica sand market to grow at a CAGR of 7.1% during 2021-2026

Figure 12: Asia Pacific forecast supply shortfall



IMARC forecasts a 40mtpa shortfall of high quality silica sand in APAC by 2026

Source: IMARC Group: Report Title "Asia Pacific Silica Sand Market"

Industry Trends, Share, Size Growth, Opportunity and Forecast 2021-2026, Report Date: February 2021

Demand drivers for silica sand

Southeast Asia becoming one of the fastest-growing solar energy markets

Indonesia aiming to reduce emissions between 29-41% by 2030

- Accelerating electrification of the world.
- Government carbon-neutrality policies.
- Structural transition from fossil fuels to greener technologies, in particular solar energy.
- Increase in vehicle production, particularly EVs using flat panel glass.
- Rising demand for energy efficient windows.
- Strong demand for fabricated flat glass products.
- Use of glass in solar thermal panels and photovoltaic modules.
- Expanding applications of glass in healthcare and electronics sectors.
- Demand for glass products with solar control and impact resistance features.

Board of Directors

Theo Psaros

Executive Chairman

Theo Psaros has over 30 years of diverse global and local commercial experience in a number of business sectors and industries within multi-million dollar publicly listed company, private companies and government departments. Theo's resource industry experience included a number of years as Chief Financial Officer and Chief Operating Officer of MetroCoal Limited, Chairman of the Surat Basin Coal Alliance and a member of the industry group that assisted with the Queensland Government Department of Natural Resources & Mines to prepare the 30-year strategic plan for the resources industry in Queensland (ResourcesQ). Theo joined the board of Metallica Minerals as Non-Executive Chairman on 1 February 2019 and was appointed as Executive Chairman on 21 May 2020.

Brad Sampson

Non-Executive Chairman

Brad Sampson is a Brisbane based internationally experienced business leader, Director and mining professional with more than 30 years resources industry experience. He brings significant mine development and operating experience to the Metallica Board along with listed company governance experience across multiple international jurisdictions. Brad has experienced all aspects of mining operations, having worked in leadership roles through the entire cycle of exploration, development, operations and closure. Brad joined the board of Metallica Minerals as Non-Executive Director on 13 May 2021.

Mark Bojanjac

Non-Executive Director

Mark Bojanjac is a Perth based company Director with more than 20 years significant experience in ASX resource companies including those that have taken exploration projects into production. He is currently Executive Chairman of PolarX Limited (ASX: PXX), Non-executive Director of Kula Gold Limited (ASX: KGD). He was previously Non-executive Director and later Managing Director of Adamus Resources leading the transition of the company to a gold producer. Mark joined the board of Metallica Minerals as Non-Executive Director on 13 May 2021.

Key Management

Scott Waddell

Chief Financial Officer & Company Secretary

Scott Waddell's resources experience was gained from eight (8) years with Metro Mining Limited and Cape Alumina Limited, nine (9) years with Anglo Coal and eight (8) years with Rio Tinto Alcan (RTA). This included direct mine site experience of 8 years. Roles included Interim CEO at Cape Alumina, CFO and Company Secretary for Metro Mining Limited and Cape Alumina Limited, Head of Finance for the Monash Energy project in Victoria's La Trobe Valley, as well as being a director of the CO2CRC Otway Pilot Project and chairman of the audit committee, Business Development Manager as well as a number of finance and corporate roles.

Scott joined the board of Metallica Minerals as Non-Executive Director on 1 February 2019 and resigned from this role on 31 August 2021. Scott has been Chief Financial Officer and Company Secretary since 21 May 2020.

Nicholas Villa

General Manager, Cape Flattery Silica

Possessing over 20 years' experience as a Mining Professional, Nicholas Villa is well practiced in the delivery of resource projects, taking them from early exploration phase through to production.

Nicholas has managed bulk commodity operations both as Principal and as Contractor, fulfilling senior management roles including Mining Manager, Project Manager and Site Senior Executive. Developing his experience in a wide range of commodities and operations across Australia, Nicholas cultivated his knowledge in as many areas as the resource industry afforded him during his career including Engineering, Maintenance, Survey, Geology and Construction.

As part of this experience, Nicholas has had comprehensive managerial involvement in large scale mobilisation of mining fleets, preceded by in depth investigation and establishment of facilities and personnel to match operational demand.

Thoroughly versed in Queensland resource project approvals processes including Environmental Studies and Native Title negotiations, Nicholas was Project Manager for the team that successfully delivered Metro Mining's Bauxite Hills mine to full production in Northern Cape York. This was comprised of both mining and marine elements, situated in a remote location with complex logistics.

Holding an Honours Degree in Geology, as well as a Diploma in Project Management, Nicholas is a long-term Member of the Australian Institute of Geoscientists. Nicholas joined Metallica Minerals on the 14th of June, 2021 with the purpose of delivering yet another successful operation in Northern Queensland.

Queensland

Brisbane	+61 7 3334 4888
Stockbroking, Corporate Advice, Wealth Management	
Brisbane: Edward St	+61 7 3121 5677
Brisbane: Tynan Partners	+61 7 3152 0600
Brisbane: North Quay	+61 7 3245 5466
Bundaberg	+61 7 4153 1050
Cairns	+61 7 4222 0555
Gladstone	+61 7 4972 8000
Gold Coast	+61 7 5581 5777
Holland Park	+61 7 3151 8300
Kedron	+61 7 3350 9000
Mackay	+61 7 4957 3033
Milton	+61 7 3114 8600
Newstead	+61 7 3151 4151
Noosa	+61 7 5449 9511
Redcliffe	+61 7 3897 3999
Rockhampton	+61 7 4922 5855
Springfield-Ipswich	+61 7 3202 3995
Spring Hill	+61 7 3833 9333
Sunshine Coast	+61 7 5479 2757
Toowoomba Chalk Capital	+61 7 4639 1277
Townsville	+61 7 4725 5787

Northern Territory

Darwin	+61 8 8981 9555
--------	-----------------

New South Wales

Sydney	+61 2 9043 7900
Stockbroking, Corporate Advice, Wealth Management	
Sydney: Grosvenor Place	+61 2 8215 5000
Sydney: Reynolds Securities	+61 2 9373 4452
Sydney: Currency House	+61 2 8216 5111
Armidale	+61 2 6770 3300
Ballina	+61 2 6686 4144
Balmain	+61 2 8755 3333
Bowral	+61 2 4851 5555
Chatswood	+61 2 8116 1700
Coffs Harbour	+61 2 6651 5700
Gosford	+61 2 4325 0884
Hurstville	+61 2 8215 5079
Merimbula	+61 2 6495 2869
Mona Vale	+61 2 9998 4200
Neutral Bay	+61 2 8969 7500
Newcastle	+61 2 4926 4044
Orange	+61 2 6361 9166
Port Macquarie	+61 2 6583 1735
Scone	+61 2 6544 3144
Wollongong	+61 2 4227 3022

Australian Capital Territory

Canberra	+61 2 6232 4999
----------	-----------------

Victoria

Melbourne	+61 3 9947 4111
Stockbroking, Corporate Advice, Wealth Management	
Brighton	+61 3 9519 3555
Domain	+61 3 9066 3200
Geelong	+61 3 5222 5128
Hawthorn	+61 3 9900 4350
South Yarra	+61 3 9006 9955
Southbank	+61 3 9037 9444
Traralgon	+61 3 5176 6055
Warramboul	+61 3 5559 1500

Western Australia

West Perth	+61 8 6160 8700
Stockbroking, Corporate Advice, Wealth Management	
Perth	+61 8 6462 1999

South Australia

Adelaide	+61 8 8464 5000
Stockbroking, Corporate Advice, Wealth Management	
Exchange Place	+61 8 7325 9200
Norwood	+61 8 8461 2800
Unley	+61 8 8155 4300

Tasmania

Hobart	+61 3 6236 9000
--------	-----------------

Disclaimer

The information contained in this report is provided to you by Morgans Financial Limited as general advice only, and is made without consideration of an individual's relevant personal circumstances. Morgans Financial Limited ABN 49 010 669 726, its related bodies corporate, directors and officers, employees, authorised representatives and agents ("Morgans") do not accept any liability for any loss or damage arising from or in connection with any action taken or not taken on the basis of information contained in this report, or for any errors or omissions contained within. It is recommended that any persons who wish to act upon this report consult with their Morgans investment adviser before doing so. Those acting upon such information without advice do so entirely at their own risk.

This report was prepared as private communication to clients of Morgans and is not intended for public circulation, publication or for use by any third party. The contents of this report may not be reproduced in whole or in part without the prior written consent of Morgans. While this report is based on information from sources which Morgans believes are reliable, its accuracy and completeness cannot be guaranteed. Any opinions expressed reflect Morgans judgement at this date and are subject to change. Morgans is under no obligation to provide revised assessments in the event of changed circumstances. This report does not constitute an offer or invitation to purchase any securities and should not be relied upon in connection with any contract or commitment whatsoever.

Sustainalytics disclaimer

Part of this publication may contain Sustainalytics proprietary information that may not be reproduced, used, disseminated, modified nor published in any manner without the express written consent of Sustainalytics. Nothing contained in this publication shall be construed as to make a representation or warranty, express or implied, regarding the advisability to invest in or include companies in investable universes and/or portfolios. The information is provided "as is" and, therefore Sustainalytics assumes no responsibility for errors or omissions. Sustainalytics cannot be held liable for damage arising from the use of this publication or information contained herein in any manner whatsoever.

Disclosure of interest

Morgans may from time to time hold an interest in any security referred to in this report and may, as principal or agent, sell such interests. Morgans may previously have acted as manager or co-manager of a public offering of any such securities. Morgans affiliates may provide or have provided banking services or corporate finance to the companies referred to in the report. The knowledge of affiliates concerning such services may not be reflected in this report. Morgans advises that it may earn brokerage, commissions, fees or other benefits and advantages, direct or indirect, in connection with the making of a recommendation or a dealing by a client in these securities. Some or all of Morgans Authorised Representatives may be remunerated wholly or partly by way of commission.

Regulatory disclosures

Analyst owns shares in the following mentioned company(ies): N/A

Recommendation structure

For a full explanation of the recommendation structure, refer to our website at morgans.com.au/research_disclaimer

Research team

For analyst qualifications and experience, refer to our website at morgans.com.au/research-and-markets/our-research-team

Research coverage policy

For an overview on the stock selection process, refer to our website at morgans.com.au/research-and-markets/company-analysis/Research-Coverage-Policy

Research independence statement

morgans.com.au/Research-Independence-Statement

Stocks under coverage

For a full list of stocks under coverage, refer to our website at morgans.com.au/research-and-markets/company-analysis/ASX100-Companies-under-coverage and morgans.com.au/research-and-markets/company-analysis/EX-100-Companies-under-coverage

If you no longer wish to receive Morgans publications please contact your local Morgans branch or write to GPO Box 202 Brisbane QLD 4001 and include your account details.

morgans.com.au