10 November 2021

CAPE FLATTERY SILICA SAND PROJECT PRODUCTION TARGET

Highlights

- **Upgraded High Quality Silica Sand Mineral Resources of 47.8Mt[1] Measured and Indicated (refer Table 3) at 99.2% silica (SiO_2) supports a long-term mine life production target**
- **Scoping Study updated to include new Mineral Resources estimate and to support the statement of a production target**
- **Project forecast to generate strong financial results**
- **Pre-Feasibility Study underway and planned for completion in Q1 2022**

Queensland-based silica sand developer, Metallica Minerals Limited (Metallica, ASX: MLM) is pleased to announce that it has completed an Updated Scoping Study with a production target and positive financial outcomes on its 100%-owned Cape Flattery Silica Sand (CFSS) Project in Far North Queensland.

Summary of key outcomes - Updated Scoping Study and Mineral Resource Increase[2,3]

- New estimate of Mineral Resources includes 48Mt[1] Measured and Indicated Resources (refer to Table 3) supporting a forecast Run of Mine (ROM) extraction of 1.8Mtpa ROM to generate 1.35Mtpa silica sand product sales over a 22-year mine life.

  There is a low level of geological confidence associated with inferred mineral resources and there is no certainty that further exploration work will result in the determination of indicated mineral resources or that the production target itself will be realised.

- The production target supports an estimated project NPV[8] before tax of $253m, with IRR of 38% (both pre-tax) and payback on capital of 2.9 years.
- The updated Scoping Study has forecast that the project may generate net cash of approximately $707M (pre-tax) over the 22-year period (after repayment of the initial capital).

The Production target incorporating the results of the updated Scoping Study demonstrates that the CFS Project has potential to provide significant financial returns as shown in Table 1 below.

These results have increased the Company's confidence in the quality of the project.

Table 1: Key Results of the CFS Project[2,3]

Description	Updated Scoping Study
NPV[8] before tax	AUD$253m
IRR (before tax)	38%
Forecast sale price (US$47.50/sales tonne)	AUD$63.3/t
Site Operating Costs (AUD$/sales tonne)	AUD$33.0/t
Net forecast operating margin (AUD$/sales tonne)	AUD$30.3/t
Forecast net annual operating cash flow (1.35mt per annum)	AUD$37m
Payback on capital (from date of first production)	2.9 years

[1] Refer ASX Release dated 21 October 2021 "Revised 40% Increase of the Cape Flattery Resource to 53.5Mt ".

[2] These results are based on the assumptions disclosed in the original Cape Flattery Scoping Study released to the ASX on 18 August 2021 (Initial Scoping Study) plus the upgraded Mineral Resource (refer to Table 3)[1].

[3] The Company confirms that the material assumptions underpinning the forecast financial information in the initial public report announced on 18 August 2021 continue to apply and have not materially changed except as updated in this announcement.

Metallica's Executive Chairman, Theo Psaros states, *"The immediate proximity to the world's largest silica sand mine owned by Mitsubishi, the positive financial and production results detailed in the Updated Scoping Study and the potential to construct a jetty solely for our own transhipping operations, support our continued investment in the Project's development. Our Project continues to gain support from the local indigenous corporations and a number of key government agencies."*

"Metallica's immediate focus is now to progress the Pre-Feasibility study, which is planned for completion in Q1 2022. With the metallurgy test results already released (refer to ASX Release: 22 June 2021 'Excellent Metallurgical Test Results on Cape Flattery Silica'), further testing on the samples from the July/August 2021 drilling program are underway. These results will determine the range of end-product specifications"

This ASX Announcement has been approved in accordance with the Company's published continuous disclosure policy and has been approved by the Board.

For further information, please contact:

Mr Theo Psaros
Executive Chairman

Mr Scott Waddell
CFO & Company Secretary

+61 (7) 3249 3000 +61 (7) 3249 3000

CAUTIONARY STATEMENTS

Scoping Study

The production target and forecast financial information in the Updated Scoping Study (Scoping Study or Study) referred to in this Announcement has been undertaken to determine the potential viability of continuing the exploration, evaluation and development of Metallica's CFS Project (or Project). It is a preliminary technical and economic study of the potential viability of the CFS Project. The Updated Scoping Study outcomes, production target and forecast financial information referred to in this release are based on low level technical and economic assessments that are not sufficient to support the estimation of ore reserves. While each of the modifying factors was considered and applied, there is no certainty of eventual conversion to Ore Reserves or that the production target itself will be realised. Further evaluation work and appropriate studies are required before Metallica will be in a position to estimate any ore reserves or to provide any assurance of an economic development case. The Study referenced in this announcement is an extension of the original Cape Flattery Scoping Study released to the ASX on 18 August 2021. As such, the Study confirms the key assumptions and modifying factors used in the Initial Scoping Study.

The Mineral Resource

The Study is based on Measured Mineral Resources (18%) and Indicated Mineral Resources (71%). The total Mineral Resource also includes the Inferred Mineral Resources (11%); however, these are not required to underpin the Study or Production Target. The current level of geological confidence associated with the Project's Mineral Resource is based primarily on confirmatory and partially semi-gridded spaced drill coverage. The geology comprises well known aeolian-derived sand dunes. Campaigns of vacuum drilling (120 holes), hand-augering (8 holes) and field work have a high degree of confidence in the geological interpretation and substantiated that high-quality silica sand with relative low iron (Fe_2O_3) is present across the wider Project area.

The mineralisation of the CFS Project is best described as a surface deposit of sand dunes. The deposit is by far dominated by high-purity (>98.5%) silica (quartz) sand which is principally white in colour and fine-grained. The dunes are mainly stabilised and lightly vegetated, but their forefronts are active with exposed white sand. The depths of clean white high-quality sand ranges from zero metres on the fringe of the dunes up to a maximum thickness of 35m. To date, the average drilled thickness is approximately 17m. These sands overlie, to varying depths, yellow-orange-brown (coloured) silica sands of lower SiO_2 percentage.

The Project lies in the northern most part of the Quaternary age Cape Flattery-Cape Bedford dunefield complex, immediately adjacent to Cape Flattery Silica Mines Pty Ltd's (CFSM's) mining leases that are owned by Mitsubishi Corporation (Mitsubishi). The Project site is defined by two (2) large, elongated southeast-northwest trending dunes: 1) a 2.5-kilometre-long west dune and 2) a shorter 1+-kilometre-long but wider (up to 900m) elongate dune to the east. A more subdued, less continuous middle or central dune lies between these dunes. They are separated by defined narrow interdune corridors, which in part, expose coloured sands. The dunes have been designated as the West, Central and East dunes and range from 10m to 90m above sea level (ASL).

The results of metallurgical test work completed to date have been highly positive, demonstrating a high-grade 99.8% SiO_2 and relatively low contaminant silica sand with an attractive narrow particle-size distribution can be generated with a high-to-moderate yield. Using gravity upgrading, magnetic separation and particle classification methods, all typically used in silica sands refining, the silica sand that was generated contained 99.8% SiO_2, 450 ppm Al_2O_3, 170 ppm Fe_2O_3, 210 ppm TiO_2 and 2.6% -125-micron particles. This quality of silica sand was achieved with a mass yield of 77.4%.

Further detailed metallurgical test work is underway following the completion of the semi-gridded, infill drilling program in July/August 2021. These results are intended to improve confidence in the estimate of the Mineral Resources and to support a Pre-Feasibility Study.

The Scoping Study indicates there is the potential to economically extract the majority of the Measured and Indicated Mineral Resources using surface to shallow open-cut operation. Inferred Mineral Resources may also

have the potential to be economically extracted; however, have not been included in the Scoping Study at this stage and this will be further investigated as part of the Pre-Feasibility Study.

The Scoping Study is based on the material assumptions outlined below. These include assumptions about the availability of funding. While Metallica considers all of the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the Scoping Study will be achieved.

To achieve the range of outcomes indicated in the Scoping Study, there will be a further requirement to raise significant additional funding to support the CFS Project's development. Funding will likely be required for constructing the mine, which is currently estimated to be in the order of $65 million, excluding working capital and bonds. Investors should note that there is no certainty that Metallica will be able to raise that amount of funding when needed. It is also possible that such funding may only be available on terms that may be dilutive to or otherwise affect the value of Metallica's existing shares. It is further possible that Metallica could pursue other 'value realisation' strategies such as a sale or partial sale of its interest in the CFS Project. If it does, this could also materially reduce the Metallica's proportionate interest in the Project.

Given the uncertainties involved, investors should not make any investment decisions based solely on the results of this Scoping Study or any future Scoping Study updates.

Metallica discloses appropriate information of a technical nature to ensure that the market is properly informed of the Project's prospects and its potential. Accordingly, Metallica hereby outlines certain aspirational statements and discloses a Scoping Study that contains a production target. The content of the Study is based on Metallica's expectations on how the CFS Project may be developed and should not be solely relied on by investors when making investment decisions.

The Updated Study was based on the material assumptions outlined in this announcement. While Metallica considers that all material assumptions have a reasonable basis, there is no certainty that they will prove to be correct, or the range of outcomes indicated by the Study will be achieved.

Given the uncertainties involved, investors should not make any investment decisions based solely on the

Representatives of Hopevale Congress and Walmbaar Aboriginal Corporation completing the installation water monitoring bores. L-R Nathaniel Walker, Naamon Walker, Niall Corbus, Vernon Yoren, Shailand Deeral-Rosendale and Trenton McLean)

Material Assumptions used in the Updated Scoping Study

Construction Capital and the sale price assume an average of the high and low estimates released in the Scoping Study on 18 August 2021, whereas the operating costs are assumed to be the high price, for the estimate shown below:

Table 2: Key Assumptions for the CFS Project

Description	Updated Scoping Study	Scoping Study (18 Aug 2021)	
	Base Case price	Low price	High price
Price per sales tonne (FOB, USD$/t)	47.50	40.00	55.00
Exchange Rate (AUD$ / USD$)	0.75	0.78	0.78
Price per sales tonne (FOB, AUD$/t)	63.33	51.28	70.51
Construction Capital (AUD$, million)	65.5	56.0	75.0
Site Operating Costs (AUD$/t)	33.00	29.00	33.00
Annual Mining Rate (Mtpa)	1.8	N/A	N/A
Recovery Rate	75%	N/A	N/A
Annual Production and Sales (Mtpa)	1.35	N/A	N/A
Life of Mine	22 years		

Assumptions used for the above include the following:

1. Price of the silica sand is based on a Free-On-Board (FOB) price, which assumes payment on delivery of the sand to the Ocean-Going Vessel in the Port of Cape Flattery, and the buyer is responsible for shipping costs. The sale price calculation and assumptions are further detailed in Table 5.
2. Site Operating Costs represent an estimate of all direct site cash costs including clearing, extraction, processing, transport, and transhipment costs. These costs are further detailed in Table 7.
3. Construction Capital details an estimate of the costs to construct the CFS Project and are further detailed in Table 6.
4. It is assumed that construction will take place over a 1-year period, prior to first production.
5. NPV has been discounted using a discount rate of 8% and is a pre-tax nominal calculation. NPV and IRR are discounted from ramp up of start-up capital.
6. Contingencies of 20% on capital costs and 10% on operating costs have been built into the financial model.
7. The Financial Model is pre-tax based, as assumptions regarding level of debt or associated financing costs are undefined within this level of study and the model implicitly assumes the project is 100% equity funded.
8. The AUD$/USD$ exchange rate has changed from 0.78 used it the Initial Scoping Study to 0.75 used in this Updated Scoping Study. This change is based on updated current market assumptions of the exchange rate environment.
9. The sales ramp-up is based on 1Mt of sales in the first year of operation, then 1.35Mtpa thereafter.
10. Total life of mine is assumed to be 22 years from first production, with rehabilitation costs assumed to equal the amount of the environmental and jetty bond.
11. Total ROM extraction is forecast to be 39.2Mt over 22 years of production, which is 82% of the total Measured and Indicated Mineral Resources (47.8Mt). This is considered conservative to allow for dilution and other losses from the CFS operation.
12. 100% of the proposed 22-year operation falls within the Measured and Indicated Mineral Resource category.

13. The scoping study has a degree of accuracy of plus or minus 35%.
14. Items excluded from the CAPEX estimate in Table 6, but included in the calculation for the NPV include:
    - » Insurance
    - » Working Capital (assumed at AUD$15m, or 3 months of operations)
    - » Environmental or jetty bonds
    - » Inventory
    - » Some permitting and exploration costs.

Project Overview

Metallica's 100%-owned CFS Project is an early-stage silica sand development that is based within Metallica's EPM 25734 at Cape Flattery in Far North Queensland. EPM 25734 is located adjacent to a world-class silica sand projects owned by Mitsubishi.

Drilling on EPM 25734 in December 2020 and July - August 2021 has confirmed that the eastern sand dunes within the tenement contain high-purity silica sand.

The Project's Study has started to evaluate an extraction and export approach that utilises these key activities:

» Open-pit extraction

» Sand purification via a processing plant

» Barging of silica sand product via a new jetty and barge-loading facility (BLF) and transhipment to bulk carriers.

This approach is similar to other known silica sand operations globally that process silica sand and export their product via a barge loading facility (BLF).

Project Area Details

The location of EPM 25734 in Cape Flattery provides Metallica with a potential direct export solution for the Project within the existing Cape Flattery Port area. Export of Project products would be from our own dedicated export infrastructure and independent of Mitsubishi's current silica sand operations that utilise direct transhipping to bulk carriers on the southern peninsula of Cape Flattery (Figure 1).

The Study's results further confirm the presence of a Project Mineral Resource that contains high-purity silica sand, as shown in white in Figure 2.

In May 2021, Metallica lodged a Mining Lease Application (MLA 100284) over the Project area to target high-grade silica sand and heavy mineral (HM) operations for a 25-year term (refer to ASX Release: 15 June 2021 'Mining Lease Application lodged for Cape Flattery Sand Project').

The MLA covers an area of 616.1 ha and includes the Project's resource area, potential water bore sites and access from a gazetted road. The MLA's boundary line as red dashes in Figure 2.

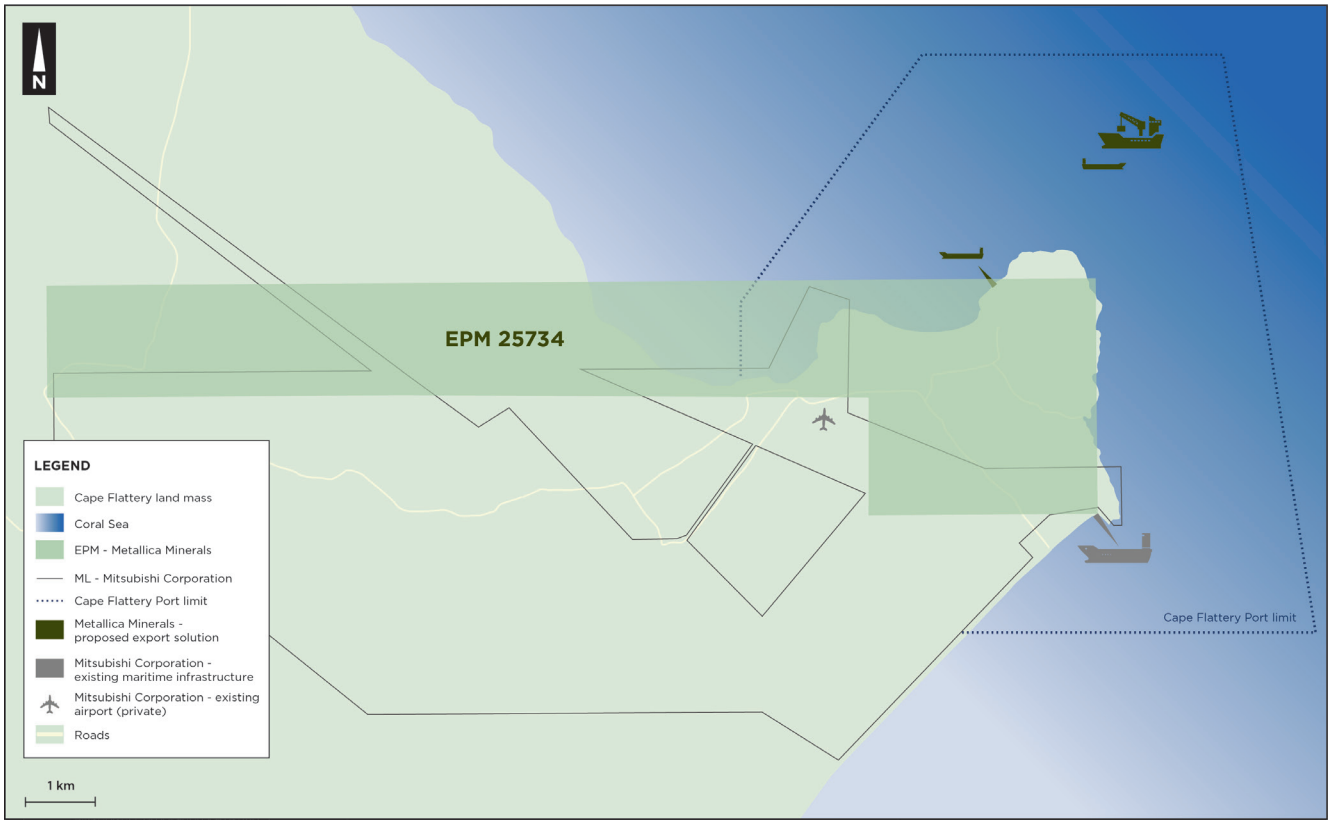


Figure 1: Metallica's EPM 25734 location at Cape Flattery within the Cape Flattery Port limit

Mineral Resource Estimation

The Production target assumes extraction of Measured Mineral Resources (18% of total extraction) and Indicated Mineral Resources (71% of total extraction) (Table 1). For further details on the resource, refer to ASX Release: 21 October 2021 'Revised: 40% Increase of the Cape Flattery Silica Sand Resource to 53.5Mt'

The current Mineral Resource has been well delineated with drilling. Given the nature of the mineralisation and style of deposit, further drilling programs are reasonably likely to improve confidence in the Mineral Resource.

Table 3: Mineral Resource Estimate for the CFS Project Area

Classification	Silica sand Mt	SiO_2 %	Fe_2O_3 %	TiO^2 %	LOI %	Al_2O_3 %	Density t/m^3	Silica sand Mm^3
Measured Resource	9.6	99.29	0.10	0.13	0.18	0.08	1.6	6.0
Indicated Resource	38.2	99.15	0.13	0.14	0.19	0.12	1.6	23.9
Inferred Resource	5.7	99.26	0.11	0.11	0.18	0.16	1.6	3.5
TOTAL	**53.5**	**99.19**	**0.12**	**0.14**	**0.19**	**0.12**	**1.6**	**33.4**

For further details, refer to ASX Release: 21 October 2021 'Revised: 40% Increase of the Cape Flattery Silica Sand Resource to 53.5Mt'.

The Mineral Resource Estimate has been reported in accordance with the JORC Code 2012. A cut-off grade 98.5% has been defined based on the surrounding data. These results show there is good potential to produce a premium grade silica product using standard processing techniques.

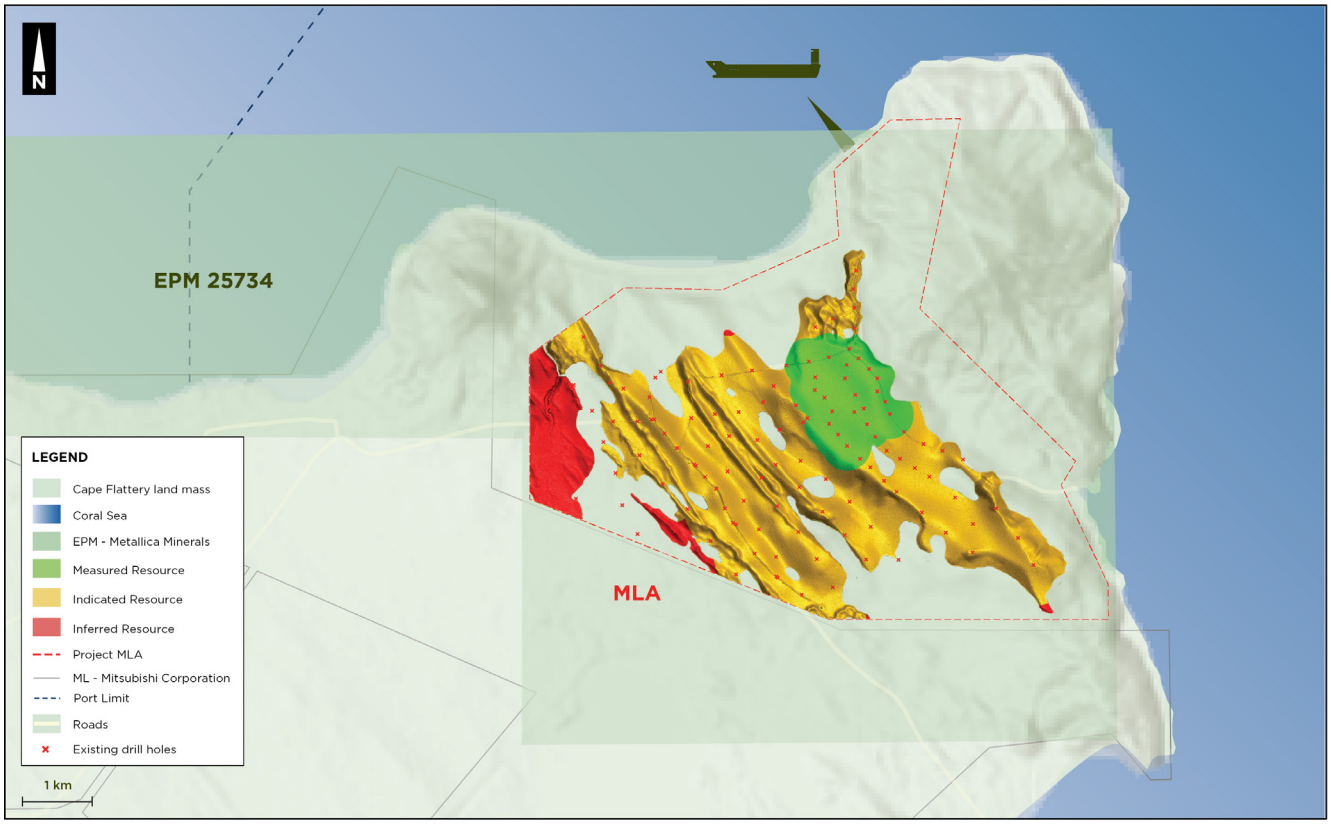


Figure 2: The CFS Project's resource area (white) situated within the Mining Lease Application (MLA) area, with the MLA's boundary line shown as red dashes

The material assumptions and key input assumptions for the Study are presented in this ASX Announcement.

The current Project Mineral Resource provides an excellent potential development platform for Metallica, which improves confidence in the estimate of the Mineral Resources and supports a Pre-Feasibility Study. (Figure 3).

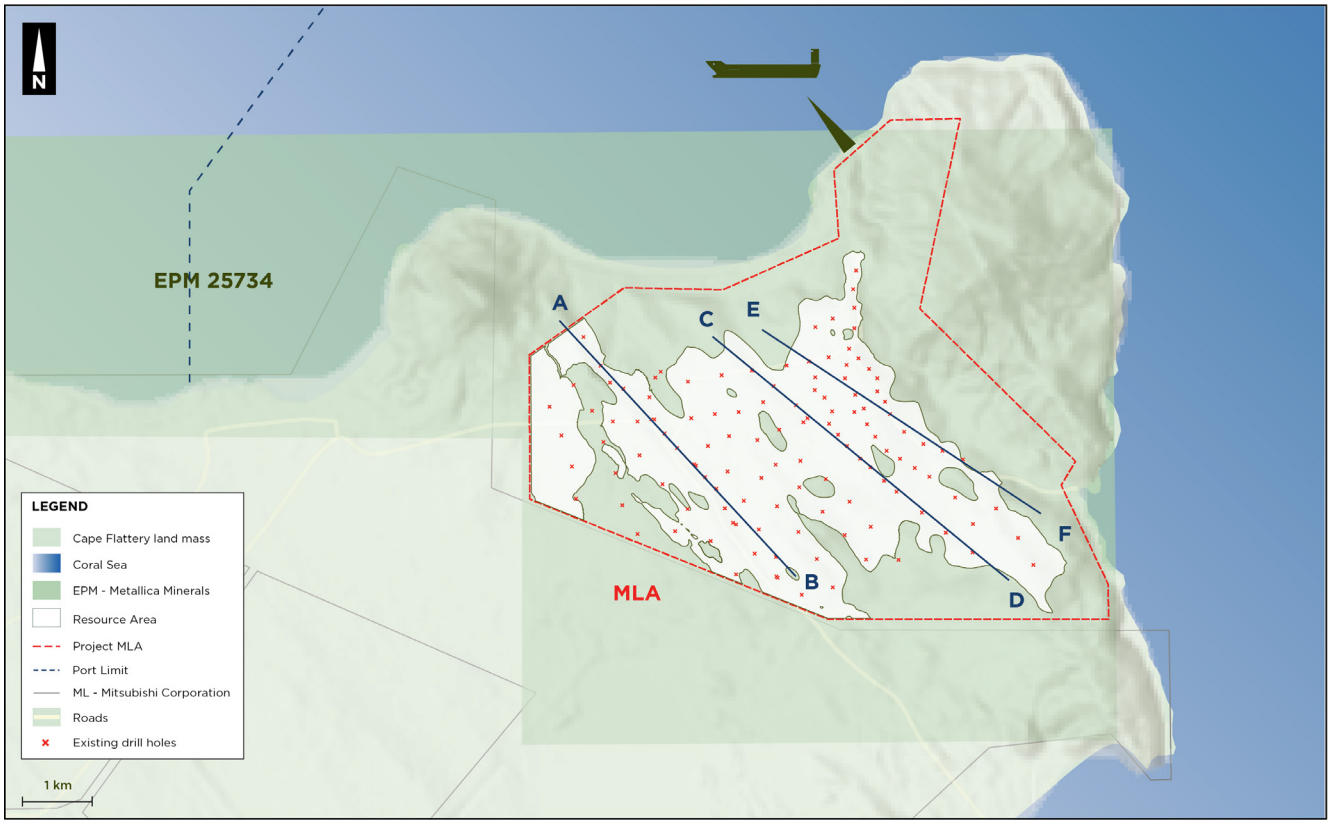
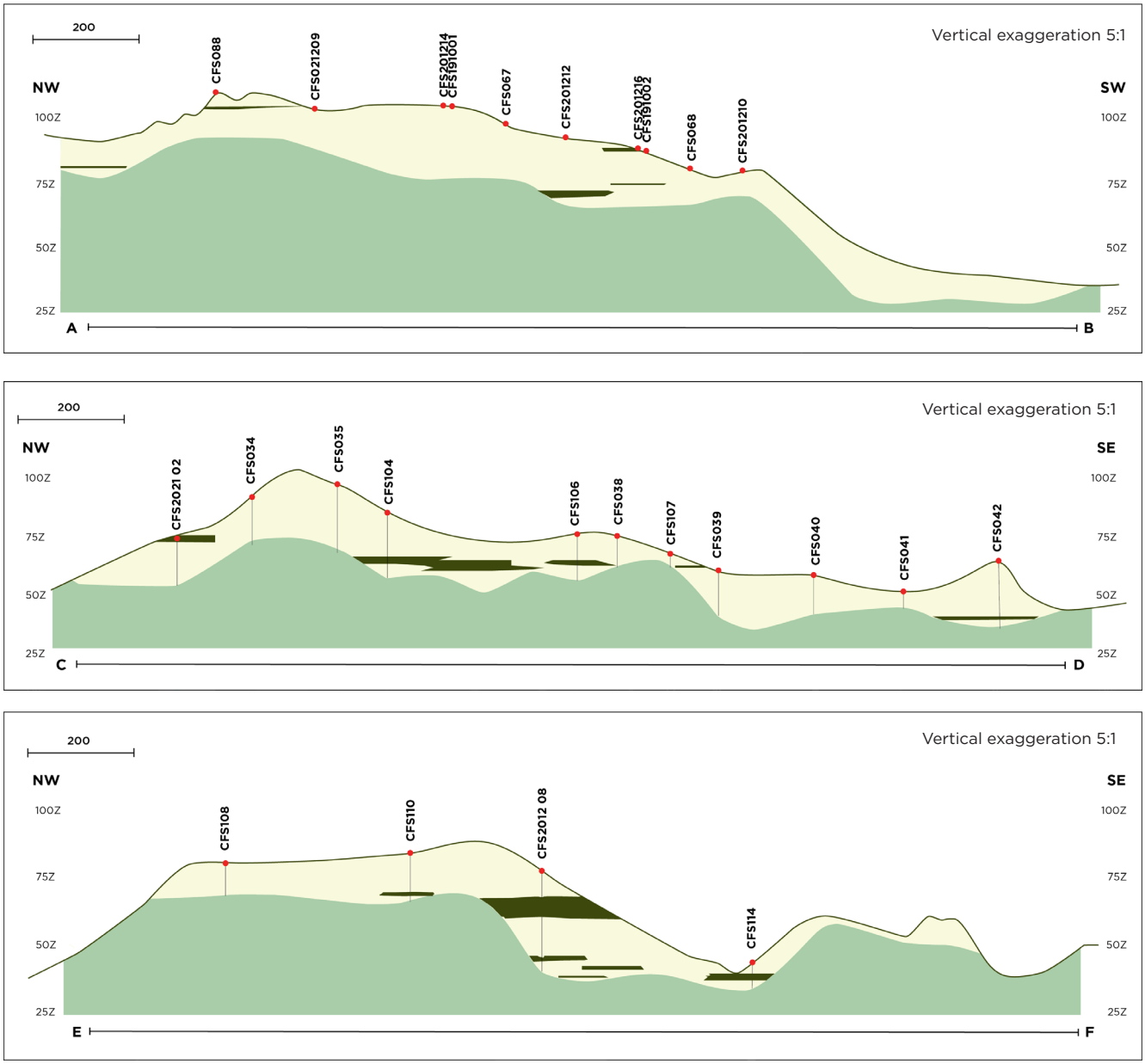


Figure 3: CFS Project - Location of sections (blue lines)



Figures 4: - CFS Project Cross Sections - Schematics based on Resource Model

Metallurgical Test Work Results

Metallurgical process development test work for the CFS Project was completed by IHC Robbins Pty Ltd (IHC Robbins) at its Brisbane laboratory.

The highlights of this test work were:

» Bulk sample metallurgical testing confirmed a high-quality silica sand product

» The work demonstrated a low contaminant silica sand product with an attractive narrow particle-size distribution that can be produced at a high-to-moderate yield

» The test work produced a product with 99.8% SiO_2, 170 ppm Fe_2O_3 and 450 ppm Al_2O_3

» The work included a bench top test to reduce Fe_2O_3 from 170 ppm to 70 ppm Fe_2O_3

» Further metallurgical testing is planned to investigate further enhancement of the processed product.

The metallurgical test work sample was derived from drill samples from within the resource area that had an average silica content of greater than 98.5% SiO_2. Using gravity upgrading, magnetic separation and particle classification methods, which are typical to silica sands refining, a Project product was able to be produced **containing 99.8% SiO_2, 450 ppm Al_2O_3, 170 ppm Fe_2O_3, 210 ppm TiO_2 and 2.6% -125-micron particles.** This product held a **mass yield of 77.4%.**

Potential exists for Metallica to market the silica sand products derived from earlier processing streams with higher yield and slightly lower quality, such as the feed preparation sand and/or spiral circuit product. Future marketing research is required to enable decision-making on the value of each potential product and best product mix. The mass yield and product quality of each of these options are summarised in Table 4.

Table 4: Potential Product Options

Potential product options	Mass yield %	Assay				
		SiO_2 %	Al_2O_3 ppm	Fe_2O_3 ppm	TiO_2 ppm	LOI 1000 %
Feed preparation sand	97.6	99.7	715	760	1,225	0.07
Spiral product	84.0	99.9	500	240	260	0.10
Up-current classifier (UCC) product	77.4	99.8	450	170	210	0.05

Demand and Market Pricing

Accelerations in construction spending and manufacturing output worldwide are expected to drive growth in important silica sand-consuming industries, including the glass, foundry and building products sectors.

Global consumption of industrial silica sand is expected to climb 3.2% pa through 2022. Asia Pacific growth is higher than global growth and is expected to be around 5% to 6% pa.

Table 5 shows the indicative silica pricing for the Project, based on benchmarking from other similar projects and Metallica's understanding of the market.

Table 5: Indicative Silica Sand Pricing (FOB)

Description	Updated Scoping Study	Initial Scoping Study	
	Base case price (per sales tonne)	Low Price (AUD$/T)	High Price (AUD$/T)
Price per sales tonne (USD$)	47.50	40.00	55.00
Price per sales tonne (AUD$, assuming 0.78 Fx)	0.75	0.78	0.78
Price per sales tonne (FOB, AUD$)	63.33	51.28	70.51

Metallica is undertaking further work to better understand the expected product pricing for each potential product and quality. Revenue is assumed to be constant and based on current prices and ignores any projected growth in prices over time.

Figure 5 and Figure 6 show industry research firm, IMARC Group's (IMARC's) view of the current and projected silica sand pricing for a high-grade product of 150-200 ppm Fe_2O_3 and a medium-grade product of 200-300 ppm Fe_2O_3. Based on these IMARC estimates, Metallica's benchmarking of the silica sand price in Table 5 is considered conservative.

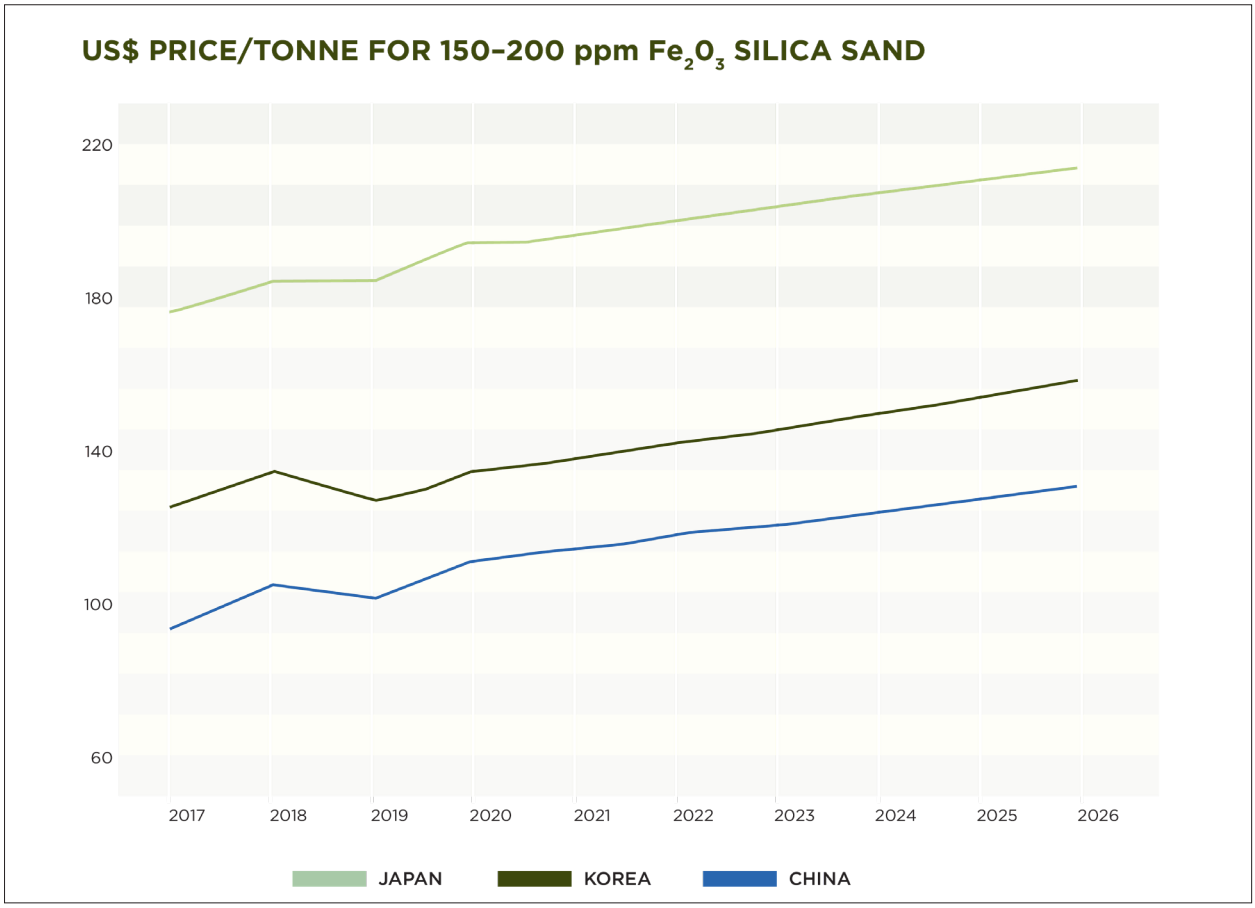


Figure 5: USD$ price/t for 150-200 ppm Fe_2O_3 silica sand

Source: PEC ASX Release: 30 March 2021 'Corporate Presentation'. From IMARC Group's report: 'Asia Pacific Silica Sand Market: Industry Trends, Share, Size, Growth, Opportunity and Forecast 2021-2026', February 2021

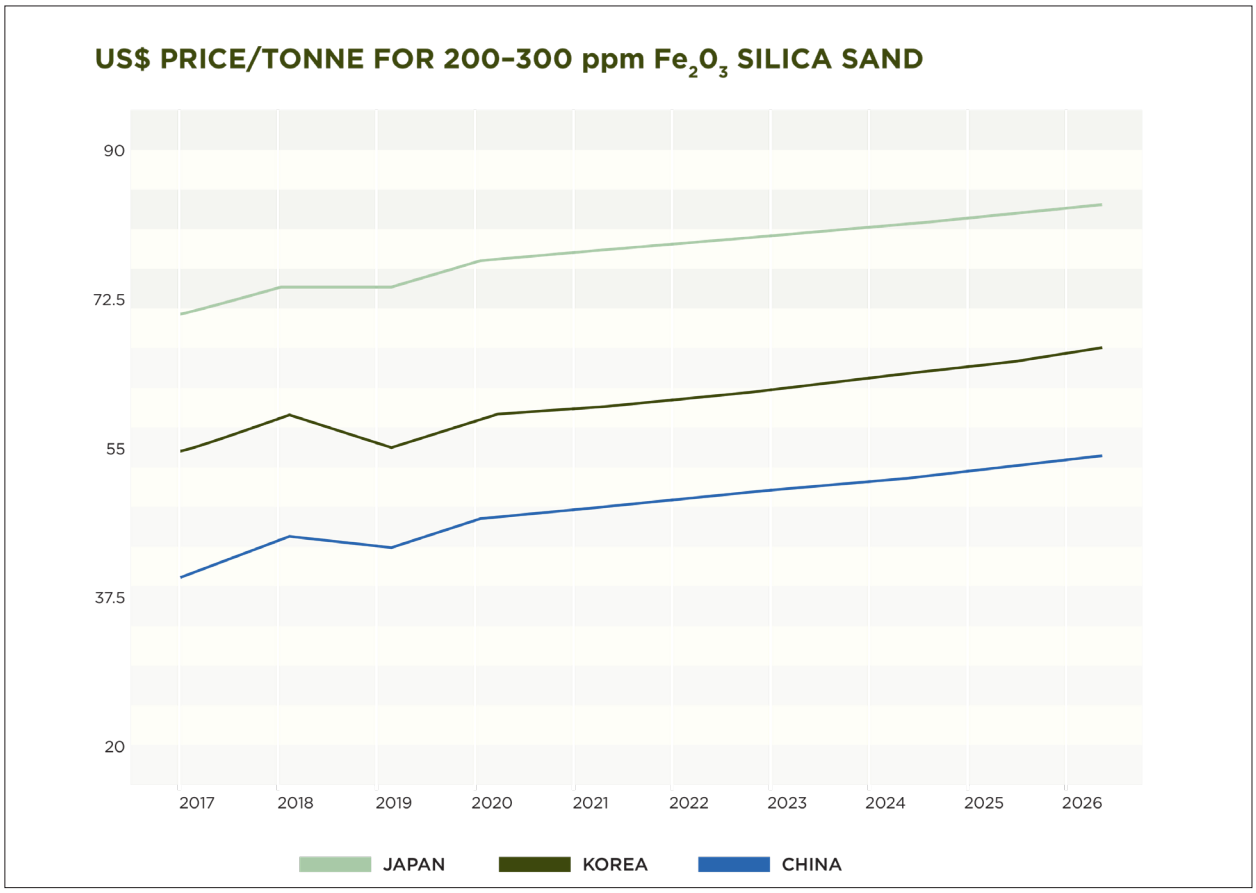


Figure 6: USD$ price/t for 200-300 ppm Fe_2O_3 silica sand

Source: PEC ASX Release: 30 March 2021 'Corporate Presentation'. From IMARC Group's report: 'Asia Pacific Silica Sand Market: Industry Trends, Share, Size, Growth, Opportunity and Forecast 2021-2026', February 2021

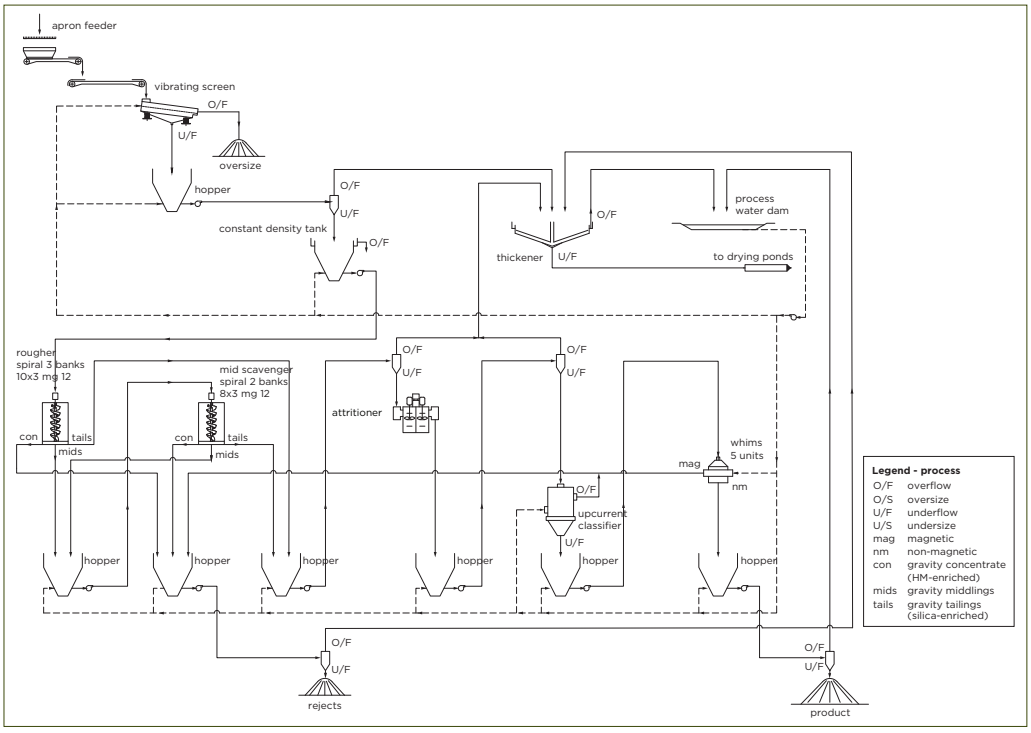


Figure 7: Block flow diagram of a process designed to produce saleable silica sand product

Processing Plant and Estimated CAPEX

Figure 7 illustrates a processing plant that is designed to produce a high-quality silica sand product, as developed by IHC Robbins in this flow diagram.

The block flow diagram in Figure 7 shows ROM material in the top left corner as being loaded into a loading bin or hopper with a grizzly and then conveyed to a trommel or vibrating screen for further removal of rocks, vegetation and other debris. The sand is then slurrified in a constant density tank and pumped to the processing plant. Here, hydrocyclones remove problematic fine particles and fine organic matter. The fines report to a thickener/clarifier unit to assist with water recycling.

The prepared sand is then processed through a 2-stage spiral separator circuit that utilises Mineral Technologies MG12 spirals to remove HM contaminants and meet glassmaking specification acceptance ranges. The silica-enriched spiral tailings stream is dewatered and pumped to attritioning cells to scrub away surface-coating contaminants from the silica grains and meet foundry specification acceptance ranges.

The attritioned sand is then washed by hydrocyclones and an up-current classifier (UCC) unit. This washing and classifier step perform a particle-sizing operation, where unwanted fine particles and any residual organic matter from the process are rejected.

The coarse product is then pumped to wet high-intensity magnetic separator (WHIMS) units for final removal of any magnetic or paramagnetic particles that were not rejected by the spiral separators. The combined reject streams are dewatered and stockpiled onsite, with an option to eventually reprocess or further upgrade or sell as a HM intermediate product.

The final silica-enriched product is also dewatered and then stockpiled to allow drainage to a low moisture content prior to transport.

Based on the metallurgical test work conducted, the Study's processing plant was modelled on a basic gravity separation plant that comprised a feed system, feed preparation, fines handling and gravity spiral separation. This plant's configuration could produce a product containing approximately 220 ppm to 240 ppm Fe_2O_3 with a mass yield of 84.0% of the ROM material (750 ppm to 800 ppm Fe_2O_3).

The inclusion of the attritioning, classification and WHIMS operations could produce a product containing approximately 170 ppm Fe_2O_3, with a mass yield of 77.4% of the ROM material. The associated budgeted CAPEX estimate for this type of plant configuration was estimated to be up to a high CAPEX cost of AUD25M. The CAPEX values considered included supply, delivery, assembly, installation and commissioning.

Based on the July/August 2021 drilling program results, Metallica is working to complete the updated metallurgical testing and reporting in the coming months – this work is currently underway with Mineral Technologies.

CAPEX Cost Estimates

Indicative CAPEX costs for the Project were estimated using benchmarking of similar projects, as well as a scoping level design and equipment selection in conjunction with consultants' advice on the input costs for similar projects.

The estimated CAPEX for the Project was estimated to cost between AUD56m and AUD75m. This range was primarily dictated by the final design of the BLF (including the required length of the jetty), the infrastructure needed for transhipping to larger ships and the final design of the processing plant. There was also an additional cost contingency for each CAPEX item in the High CAPEX estimate (Table 6).

Table 6: Potential Project CAPEX

Item	Updated Scoping Study	Initial Scoping Study	
	Base case CAPEX (AUD$)	Low CAPEX (AUD$)	High CAPEX (AUD$)
Civils, roads and clearing	850,000	700,000	1,000,000
Mining (majority of equipment leased)	1,150,000	800,000	1,500,000
Conveyor and slurry pipeline – sand transport	1,750,000	1,500,000	2,000,000
Processing plant	20,500,000	16,000,000	25,000,000
Barge Loading Facility (BLF)	24,000,000	22,000,000	26,000,000
Marine	1,250,000	1,000,000	1,500,000
Camp and other surface infrastructure	5,000,000	4,500,000	5,500,000
Contingency (~20%)	11,000,000	9,500,000	12,500,000
TOTAL POTENTIAL CAPEX	**65,500,000**	**56,000,000**	**75,000,000**

In addition to the CAPEX above, Metallica estimates that Sustaining capital is between $1,000,000 to $1,500,000 per annum.

CAPEX items included in Table 6 are:

» Civils, roads and clearing:
- Earthworks and civil
- Access and haul roads (where required)
- Stockpile pad
- Loading dock

» Processing plant:
- Laboratory
- Spiral-based processing plant with a dewatering module
- Inclusion of attrition and WHIMS in the High CAPEX estimate

» Marine:
- Ship anchors
- Cyclone moorings
- Workboat, fenders, grabs

» Camp and other surface infrastructure:
- Office block
- Freight of construction items to site
- Maintenance workshop
- Camp facilities
- Generators and solar panels
- Helipad for transport
- Site communications and infrastructure
- Fuel storage and pipeline
- Power
- Water supply
- Waste water treatment.

Items excluded from the above CAPEX estimates in Table 5, but included in the calculation for the NPV include:

» Insurance

» Working Capital (assumed at AUD$15m, or 3 months of operations)

» Environmental or jetty bonds

» Inventory

» Some permitting and exploration costs.

Other items that may impact the CAPEX estimates include:

» Exchange rate variances (where items are sourced in currencies other than AUD$)

» Inflation up to the point when binding contracts are entered into

» Final Project design

» Additional information gathered from further exploration work

» Final production rate and throughput rates of the components.

OPEX Cost Estimates

Indicative OPEX costs for the Project were estimated using benchmarking of similar projects, as well as a scoping level design and equipment selection in conjunction with consultants' advice on the input costs.

The total OPEX for the Project was previously estimated between AUD$29/t and AUD$33/t (Table 7), based on benchmarking similar silica sand development projects in Australia. This range was primarily dictated by the final design of the processing plant.

The key OPEX items included the mining and pre-stripping and rehabilitation, processing plant, BLF, transhipment and marine, and other site costs including royalties, camp, transport and utilities. To this total, an overall contingency was applied. Operating costs assume the high price, as a conservative model estimate, with a cost breakdown provided in Table 7.

Table 7: Potential Project OPEX

Item	Updated Scoping Study	Initial Scoping Study	
	Base case OPEX (AUD$/t)	Low OPEX (AUD$/t)	High OPEX (AUD$/t)
Clearing, mining and rehabilitation	6.00	5.50	6.00
Processing plant and BLF	5.50	4.50	5.50
Transhipment and marine	8.50	7.50	8.50
Royalties, camp and other site infrastructure	10.00	9.00	10.00
Contingency (~10%)	3.00	2.50	3.00
TOTAL POTENTIAL OPEX	**33.00**	**29.00**	**33.00**

OPEX items included in Table 7 were:

» Clearing/grubbing, mining and rehabilitation:
- Dozer
- Front end loader
- Secondary wheel loader
- Water truck
- Light vehicles and service truck
- Mine equipment lease costs

» Processing plant:
- Laboratory
- Spiral-based processing plant with a dewatering module
- Inclusion of attrition and WHIMS in the High OPEX estimate

» Transhipment and marine:
- Transhipment contractor
- Stevedores and load master
- Ports North harbour, tonnage and security dues
- Pilotage

» Royalties, camp and other site infrastructure:
- Administration costs, including management, environment, grade control (etc.)
- Queensland Government royalty
- Traditional landowner royalty
- Communications/IT
- Camp
- Workshop costs
- Power and water supply
- Exploration and pre-production drilling
- Barge freight
- Air freight – transport of personnel via helicopter.

Items excluded from the OPEX estimates in Table 7 were:

» Head office costs.

Other items that may impact the OPEX estimates include:

- Production and shipping rates
- Additional information gathered from further exploration work
- Exchange rate variances (where items are sourced in currencies other than AUD$)
- Inflation up to the point when binding contracts are entered into.

Estimated royalties and based on the existing rate for the State Royalty (which is reviewed every 5 years), an allowance for an expected negotiated Native Title party royalty based on production tonnes and a further industry standard agent's fee for marketing and sales of exported products.

A Queensland State Royalty at a rate of AUD$0.90/t of product was included as a cash cost. Due to the early stage of the Project, a mining agreement has not yet been finalised with the Traditional Landowners or freehold landowners.

Sensitivity Analysis

As part of the economic assessment of the Project, a series of sensitivity analyses were undertaken to assess the effect of fluctuations in metal pricing, capital cost and operating costs. Each of these variables were tested in ranges of +/- 30% to assess the effect on the economics of the Project. The results indicated the Project is most sensitive to silica sand pricing.

Next Steps

The findings of the CFS Project's Updated Scoping Study are very positive and provide solid financial results that underpin the basis for Metallica to continue to further evaluate and potentially develop the Project. Metallica is working to continue further studies to support the completion of a Pre-Feasibility Study.

Based on the July/August 2021 drilling program results, Metallica is working to complete the updated metallurgical testing and reporting in the coming months – this work is currently underway with Mineral Technologies.

Metallica is working to progress key agreements with the Traditional Landowners. Two meetings were held in Hope Vale on Wednesday, 6 October 2021. The first meeting was with representatives of Hopevale Congress Aboriginal Corporation (Hopevale Congress), as agent for the Nguurruumungu Clan, and Walmbaar Aboriginal Corporation, as agent for the Dingaal Clan. The second meeting was with members of the Hope Vale township

Metallica is continuing to progress an Environmental Approval (EA) process with both State and Federal Government authorities. The EA process requires Metallica to undertake further requisite studies before it is granted a Mining Lease.

Once a suite of marketable products has been identified, Metallica intends to seek interest from potential offtake parties and particularly for the purchase of high-purity silica sand product. This includes an assessment on the silica sand market and potential for establishing customer off-take agreements, using marketing consultants with offices in Hong Kong, China and Malaysia.

Material Assumptions

Table 8 provides the Material Assumptions that Metallica used when undertaking the CFSS Project's Study.

Table 8: Material Assumptions for the Project's Interim Scoping Study

Criteria	Commentary
Mineral Resource Estimate for conversion to Ore Reserves	The Project's Scoping Study is based on Measured Mineral Resources (18%) and Indicated Mineral Resources (71%). Due to the early stage of investigation, the mineralisation was not suitable to be defined as an Ore Reserve.
Site visits	A site visit was conducted by Competent Person, Mr B Mutton, on 13-18 December 2020 during a drilling program in the Mining Lease Area (MLA) of the Project's site. A further site visit was conducted by Competent Persons, Mr Carl Morandy and Mr Chris Ainslie, on 20 October 2021. This site visit also included a number of parties involved in preparing the PFS for the CFS Project.
Study status	The work reported in the Study is a scoping study level and was based on Measured and Inferred Mineral Resources (Measured Mineral Resources (18%) and Indicated Mineral Resources (71%)). The Study's results were considered conceptual and may not be realised when subjected to further investigation in a more detailed level of study. This is an updated Concept Study to assess the economic viability of the near-surface mineralisation. Additional evaluation programs remain in progress, which will contribute to future studies for the Project. A reasonable level of due diligence was undertaken to establish the variables used in the Study. All variables were collated and reviewed by Competent Persons with the relevant skills for their area of expertise.
Cut-off parameters	For the Study, Metallica calculated a marginal cut-off grade of 98.5% SiO2 for reporting the Mineral Resource. The cut-off grade strategy was developed from an economic analysis of the Mineral Resources and an assessment of breakeven cut-off grades to mine and process the mineralisation within the deposit. The optimisation process for the cut-off grade is yet to be completed. The cut-off grade was benchmarked against similar projects of this scale and in similar locations and was considered reasonable for the style of bulk open-pit mining.
Mining factors or assumptions	The Study was based on standard bulk mining using dozer-push techniques to extract the mineralisation from within its deposits. The Project will utilise dozer-push, load, haul and/or conveyor and processing plant design, with mining to be completed by the Owner's team comprising experienced mining staff and workers. Material that does not meet specification will be stockpiled adjacent to the pit in a designated rejects area. Similarly, processing rejects will be stockpiled adjacent to the processing plant. Estimated mining costs were based on industry standard techniques to estimate the size and cost of a mining fleet for operations at other silica sand projects.

Criteria	Commentary
Metallurgical factors or assumptions	Preliminary metallurgical test work was completed on a series of drill hole composites from within the deposit to represent different mineral grades likely to be processed should production proceed. The test work was designed to assess the potential recovery and quality of silica product that could be extracted from the mineralisation. Only silica sand products have been included in this Study. The test work demonstrated that the Project's mineralisation is suitable for processing using conventional, off-the-shelf spiral and attrition techniques to produce a saleable silica product. A conservative 75% recovery rate is assumed for the processing plant which is preliminary testing and industry benchmarks. The Metallurgical information collected to date is considered suitably rigorous to support the Scoping Study.
Environmental	An initial baseline study has commenced on site but is limited in its scope, reflecting an early stage of investigation. Wet-season study and dry-season studies have been partially completed while further studies have been planned for Q4 2021. Limited work has been undertaken to assess the environmental impact of mining on the region. However, the Project area is adjacent to Mitsubishi's silica sand mining operation, and the mining area is uninhabited. Metallica is working through the statutory processes and required studies to ensure it appropriately mitigates any environmental and social aspects than may impact the net benefits of the project.
Infrastructure	The Project area lies in a relatively remote part of Eastern Cape York, 57 km north of Cooktown and adjacent to Mitsubishi's owned and operated silica sand mine. The Project can be accessed via a road from Cooktown using sealed and unsealed roads during the dry season only. The Project area can also be accessed via a barge or helicopter. There are no publicly available electricity power lines near the Project's area and power for the Project is expected to be sourced from generators. There is currently no accommodation in the Project area and a camp is expected to be built if the Project proceeds. All other mine infrastructure will need to also be built as part of the Project's development and costs, and such, the estimated cost of this infrastructure is based on similar silica sand projects.

Criteria	Commentary
Barge-Loading Facility (BLF)	The Study assumed that a BLF facility similar to that used by other mining projects in Queensland (i.e. Weipa bauxite operations) will not likely be constrained by water access issues. **BLF civil infrastructure** Any material to construct roads and pads will likely be available from site-sourced borrow pits. Site-sourced borrow pit material appears to be adequate and sufficient to construct non-process infrastructure such as: » Pads/laydown areas » Water storage facilities » Clean water/dirty water diversions. No allowance was made for any treatment or management of acid sulphate soils as the nature of the geology and sand environment and the planned activities mean no acid sulphate soils are expected to be encountered. **BLF mechanical infrastructure** To lessen the time for the main barge to be in standby, the apron feeder, barge loader and conveyor are assumed to have capacity to load up to 1,200 tph. However, BLF infrastructure will need to be built as part of the Project's development and costs, and such have been included in the Study's cost estimates.
Transhipment	The Study assumes that transhipment can occur all-year-round; however, the application of lower shiploading productivity rates were made during the months of the year when higher wave movements are most likely to occur. Metallica is in the process planning for the deployment of a 'Waverider' buoy to obtain wave and current data specific to the area (and other additional metrics). Once this information is obtained, it will be used in further Project studies. Transhipment has historically been used to load silica sand onto bulk carriers at the Cape Flattery Port by another silica sand operator.

Criteria	Commentary
Costs	**Capital expenditure (CAPEX)** The development of the Project was divided into several phases to sequence capital expenditure. The capital cost estimate for the Study was compiled from preliminary plans for civil engineering works, mining and processing equipment and associated infrastructure. The capital costs were prepared using current inhouse data from other projects, industry standard estimating factors and benchmarking against other projects; and also, for several items, from contractor reports. A 20% capital expenditure contingency allowance was applied to capital costs to provide some conservatism in this level of study. The capital cost estimate was compiled in AU$ with a base date of end of Q2 2021 in real terms, with no allowance for escalation or inflation. Regarding the proposed BLF design, the overwater conveyor and pads are yet to be designed to account for the highest astronomical tide (HAT). Pile heights and bulk earthworks will be engineered with HAT taken into consideration; however, the final design may potentially influence the Project's overall CAPEX. **Operating expenditure (OPEX)** The operating cost estimate for the Study included all operating costs associated with mining, processing, infrastructure and site-based general and administration costs for other similar silica sand projects. The operating costs were developed based on comparative costs for operations of similar size and contractor estimates for key pieces of processing infrastructure.
Revenue factors	Revenue from the Project will be derived from the sale of clean silica product. Metallica has established the characteristics of expected final products through benchmarking against comparable processing operations, and the preliminary metallurgical test work reviewed by the Competent Person for this Study. This benchmarking process underpinned the payability assumptions for the silica product presented. Silica product prices were estimated using industry benchmarks and information from pre-feasibility studies for other silica sand companies. Key risks associated with these assumptions included that the revenue may be lower than expected, the silica product quality may differ from expectations and the price assumptions may not be met.
Market assessment	The market for Metallica's silica sand product is reasonably well-established. The silica sand product that would be produced by the Project is expected to be similar to the product sold from Mitsubishi's adjacently owned and operated silica sand mine, which is currently understood to be exporting approximately 3 Mtpa of silica sand product. There are no actively traded spot markets for silica sands and no known forward dated derivative financial instruments. Prices set in silica sand markets reflect underlying product demand and supply conditions and market sentiment. These prices are often the reference prices used by companies in negotiating offtake and/or sales agreements with counterparties.

Criteria	Commentary
Economics	The Study was a preliminary technical and economic study based on low-level technical and economic assessments (+/-35% accuracy) that are not sufficient to support the estimation of Ore Reserves. Further evaluation work and appropriate studies are required before the Project can estimate any Ore Reserves or provide any assurance of economic development. The royalty payable to the Queensland Government for sale of silica sands is well understood and established, and currently understood to be $0.90/t of silica sand sold.
Stakeholder engagement	The Study considered development of the Project via a staged bulk mining operation with the construction of a processing facility at site, along with a barge-loading facility. Metallica expects that Project development will create significant social and economic benefits for local communities, including employment opportunities. Community programs and social impact studies will commence in the next round of studies and Metallica has been proactive in developing connections with local community members and in particular, Hopevale Congress Aboriginal Corporation Registered Native Title Body Corporate (RNTBC) Trustee – on behalf of the Nguurruumungu Clan, and Walmbaar Aboriginal Corporation – on behalf of the Dingaal Clan. Metallica is also in regular consultation with the regional Cooktown Shire Council, Hope Vale Shire Council, Hope Vale Aboriginal Shire Council and the Queensland State Government.
Classification	No Ore Reserves were classified as part of the Study. Due to the conceptual nature of the capital and operating costs, economic viability was not demonstrated and therefore, no Ore Reserves were declared.
Audits or reviews	All key resource inputs were approved by Competent Persons, as defined by the JORC Code 2012. Resource inputs were the subject of internal peer reviews by discipline experts and were not subject to an external audit.
Discussion of relative accuracy/confidence	The accuracy or confidence used in the Study was commensurate with a scoping study level that is nominally +/-35%. All resource estimates were prepared by Competent Persons with strong experience in their fields and benchmarked against similar projects. Due to the conceptual nature of the Study and uncertainty over future silica sand product prices, the Study's results are subject to change. It is likely that with additional exploration work, aspects of the resource will change and these will impact the amount of mineralisation available for mining.

Competent Person Statement

Cape Flattery Silica Sands Exploration Results

The information in this report that relates to the Exploration Sampling and Exploration Results is based on information compiled by Mr Patrick Smith, a Competent Person who is a Member of the Australian Institute of Mining and Metallurgy.

Mr Smith is the owner and sole Director of PSGS Pty Ltd and is contracted to Metallica Minerals as their Exploration Manager. Mr Smith confirms there is no potential for a conflict of interest in acting as the Competent Person. Mr Smith has sufficient experience that is relevant to the style of mineralisation and type of deposits under consideration and to the activity being undertaken 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".

Mr Smith consents to the inclusion of this information in the form and context in which it appears in this release/report.

Cape Flattery Silica Sands Mineral Resource

The information in this report that relates to the Cape Flattery Silica Project – Eastern Resource Area is based on information and modelling carried out by Chris Ainslie, Project Engineer, who is a full-time employee of Ausrocks Pty Ltd and a Member of the Australasian Institute of Mining & Metallurgy. The work was supervised by Mr Carl Morandy, Mining Engineer who is Managing Director of Ausrocks Pty Ltd and a Member of the Australasian Institute of Mining & Metallurgy and also by Mr Brice Mutton who is a Senior Associate Geologist for Ausrocks Pty Ltd. Mr Mutton is a Fellow of the Australasian Institute of Mining & Metallurgy and a Fellow of the Australian Institute of Geoscientists. Mr Morandy and Mr Ainslie and Mr Mutton are employed by Ausrocks Pty Ltd who have been engaged by Metallica Minerals Ltd to prepare this independent report, there is no conflict of interest between the parties. Mr Morandy, Mr Ainslie and Mutton consent to the disclosure of information in the form and context in which it appears in this report.

The overall resource work for the Cape Flattery Silica Project – Eastern Resource Area is based on the direction and supervision of Mr Mutton who has sufficient experience that is relevant to the style of mineralisation and type of deposits under consideration and to the activity being undertaken 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 corresponding JORC 2012 Table 1 is attached.

Cape Flattery Silica Sands metallurgy

The technical information in this report that relates to process metallurgy is based on information reviewed by Arno Kruger (MAusIMM) and work completed by IHC Mining. Mr Kruger is a metallurgical consultant and an employee of IHC Mining. Mr Kruger has sufficient experience that is relevant to the type of processing under consideration and to the activity being undertaken to qualify as a Competent Person as defined by the JORC Code 2012. Mr Kruger consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

Reference to Previous Releases

Initial Scoping Study results were released to the ASX on 18 August 2021 "Scoping Study for Cape Flattery Silica Sand Project" and the results in this announcement are to be read in conjunction with this ASX release.

Drilling, resource estimates and metallurgical results referred to in this announcement have been previously announced to the market in reports dated; 2nd March, 15th June, 22nd June, 12th August and the 21st October 2021 and are available to view and download from the Company's website: https://www.metallicaminerals.com.au/asx-announcements

The Company confirms that it is not aware of any new information or data that materially affects the information included in the original announcements. Metallica confirms that the form and context in which the Competent Person's findings are presented have not been materially modified from the original market announcements.

Forward-looking statements

Forward-looking statements are based on assumptions regarding Metallica, business strategies, plans and objectives of the Company for future operations and development and the environment in which Metallica may operate.

Forward-looking statements are based on current views, expectations and beliefs as at the date they are expressed and which are subject to various risks and uncertainties. Actual results, performance or achievements of Metallica could be materially different from those expressed in, or implied by, these forward-looking statements. The forward-looking statements contained in this report are not guarantees or assurances of future performance and involve known and unknown risks, uncertainties and other factors, many of which are beyond the control of Metallica, which may cause the actual results, performance or achievements of Metallica to differ materially from those expressed or implied by the forward-looking statements. For example, the factors that are likely to affect the results of Metallica include general economic conditions in Australia and globally; ability for Metallica to funds its activities; exchange rates; production levels or rates; demand for Metallica's products, competition in the markets in which Metallica does and will operate; and the inherent regulatory risks in the businesses of Metallica. Given these uncertainties, readers are cautioned to not place undue reliance on such forward-looking statements.

JORC Code, 2012 Edition – Table 1 Report

Cape Flattery Silica Project - Eastern Resource Area
Upgraded Mineral Resource Estimate – Measured, Indicated and Inferred, October 2021

Section 1 Sampling Techniques and Data (Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	» Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling. » Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used. » Aspects of the determination of mineralisation that are Material to the Public Report. » In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.	» Drilling was completed using a tractor mounted vacuum rig, with samples predominantly collected every one meter. Occasionally samples of less than one meter were collected (usually at the top of the hole), The drilled sand was collected from a cyclone and 100% of the sample was collected and placed into a pre-numbered sample bag, with each sample having a mass of between 2.5 to 4kg. » Seven hand auger samples from a 2020 programme were used in the Mineral Resource estimate, The hand auger holes were samples were between 1-2kg in weight (~50% of drill material returned via the auger) and collected and bagged. Care was taken to remove possible contamination from the Shell Auger. » In the case of the drill samples the entire 1m sample was collected on site and dispatched to the laboratory for splitting and analysis (2021 programme), In the 2020 programme a spear sample of the 1m was taken and submitted for assay. » Samples were submitted to ALS Laboratories in Brisbane for drying, splitting and pulverization in a tungsten carbide bowl, prior to being analysed by an XRF analysis. » Sampling techniques are mineral sands "industry standard" for dry aeolian sands with low levels of induration and slime. » As the targeted mineralization is silica sand, geological logging of the drill material is a primary method for identifying mineralisation. » Samples from this drilling programme have been selected for Metallurgical testwork. These samples will be composited to form a bulk sample. Initially all the samples (above the COG) for each hole within the Measured Mineral Resource area will be composited to form a bulk sample for metallurgical testwork. Selected samples with high clay content are also being tested to determine if the purity of the SiO_2 in the sample can be upgrade by scrubbing out any clay.
Drilling techniques	» Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).	» Two (2) drilling techniques were used to collect samples for the Mineral Resource estimate, namely hand-auger and vacuum drilling operated by Yearlong Drilling Contractors. All holes were drilled vertically. » Vacuum drilling was by a 4x4 tractor mounted drill rig with a blade drill bit diameter of 60mm equivalent to NQ sample size, using 1.8m rods. » Holes were terminated in a basement layer (clay/ coloured sands) or when the very damp sand or water was intersected.

Criteria	JORC Code explanation	Commentary
Drill sample recovery	» Method of recording and assessing core and chip sample recoveries and results assessed. » Measures taken to maximise sample recovery and ensure representative nature of the samples. » Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	» Visual assessment and logging of sample recovery and sample quality. » Vacuum drilling is low disturbance and low impact, minimising drill hole wall impact and contamination. » Samples are collected in a cyclone which has a clear Perspex casing allowing visual inspection of sample as they are being collected. » Regular cleaning of cyclone and drill rods was utilised to prevent sample contamination. » No sample bias occurred between sample recovery and grade. » The consistent weight of the samples indicates that recovery of between 90 to 100% was achieved, lower recoveries (less than 80%) were recorded in the top 1m of each hole due to the presence of organic matter and topsoil.
Logging	» Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies. » Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography. » The total length and percentage of the relevant intersections logged.	» Geological logging of the total hole by field geologist, with retention of sample in chip trays to allow subsequent re-interpretation of data if required. » The total hole was logged at 1m intervals; logging includes qualitative descriptions of colour, grain size, sorting, induration and estimates of HM, slimes and oversize utilising panning. » Photographs of each chip tray were taken so a digital visual record of each of the drill holes was obtained. » Logging has been captured through field drill log sheets and transferred through to an excel spreadsheet which is then transferred to a central database and storage prior to being provided to a third-party consultant (Ausrocks) for Mineral Resource estimation.
Sub-sampling techniques and sample preparation	» If core, whether cut or sawn and whether quarter, half or all core taken. » If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry. » For all sample types, the nature, quality and appropriateness of the sample preparation technique. » Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples. » Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/ second-half sampling. » Whether sample sizes are appropriate to the grain size of the material being sampled.	» Hand-auger holes were sampled in 1m intervals with 1-2kg (~50% of drill material returned via the auger) collected and bagged. » For the August vacuum drilling programme sample for the entire 1m interval was collected from the cyclone. » The entire one meter (1) samples were placed in a numbered calico bag (August 2021), or subsamples of approximately 500g were speared and separately numbered, bagged and sealed ready for assaying (December 2020 programme) prior to being placed in a poly-weave sack for dispatch to the laboratory. » Each one meter sample weighed between 2.5 to 4.0Kg. » At ALS the samples were split to 100gram samples for analysis in the laboratory under laboratory-controlled methods. » The sample size is considered appropriate for the grain size of material, average grain size (87% material by weight between 0.125mm and 0.5mm. » The Competent Person considers the sample preparation to be appropriate for drilling of this nature. » The Competent Person considers the sample sizes to be appropriate for the type of material being sampled. Appropriate sample sizes and pulverisation of the entire sample support good representivity.

Criteria	JORC Code explanation	Commentary
Quality of assay data and laboratory tests	» The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total. » For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc. » Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.	» All assaying has been carried out by ALS Mineral Laboratories, Brisbane. ALS is a global leader with over 71 laboratories worldwide providing laboratory testing, inspection certification and verification solutions. ALS Quality Assurance and all ALS geochemical hub laboratories are accredited to ISO/IEC 17025:2017 for specific analyses, which includes their Townsville and Brisbane laboratories. ALS is NATA Accredited, Corporate Accreditation No. 825, Corporate Site No. 818. » XRF was chosen as the most cost-effective assaying method for silica and minor elements for all exploration samples. » Analysis was undertaken by ALS Brisbane utilising a Tungsten Carbide pulverization, ME-XRF26 (whole rock by Fusion/XRF) and OA-GRA05 (H_2O/LOI by TGA furnace). » There is an alternative ICP method which has lower detection limits for the other oxides such as Fe2O3 and Al_2O_3, but the SiO_2 assay is determined by calculation and not a measured quantum. » Internal laboratory QAQC checks include the analyses of standards, blanks and duplicates. » Acceptable levels of precision and accuracy were established. » QC procedures - No duplicate samples were collected in the field for the August 2021 programme as the entire sample was submitted to the laboratory. However selected duplicate samples have been selected from the coarse rejects at the laboratory, for duplication, Inter-laboratory checks will also be undertaken by Intertek in Perth.
Verification of sampling and assaying	» The verification of significant intersections by either independent or alternative company personnel. » The use of twinned holes. » Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols. » Discuss any adjustment to assay data.	» Significant intersections validated against geological logging and local geology/ geological model. » No holes have been twinned, as the grade continuity in the holes is consistent. » All data captured and stored in both hard copy and electronic format. Assay data had to be adjusted in some locations for the 0-1m interval due to minor topsoil contamination. » All digital data is verified by the Competent Person. » No adjustments were made to assay data. » Significant intersections were independently validated by Ausrocks against geological logging and the geological model. » Four (4) holes have been twinned with vacuum and hand-auger to check repeatability of drill results. To date, there is a strong correlation between results from different type holes and different assay batches. Downhole variability is matched in different drill programs and different assay batches. » The infill drilling in 2021 validated the 2020 programme as the intercepts and grade of the silica were consistent along the various sections.
Location of data points	» Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation. » Specification of the grid system used. » Quality and adequacy of topographic control.	» All holes initially located using handheld GPS with an accuracy of 5m for X, Y. » UTM coordinates, Zone 55L, GDA94 datum. » LiDAR topography and imagery with a vertical accuracy of <10cm was used as the topographic surface. Collar RL's draped against this surface verifies the accuracy of the hole locations. The Lidar imagery which was produced by Aerometrex.

Criteria	JORC Code explanation	Commentary
Data spacing and distribution	» Data spacing for reporting of Exploration Results. » Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied. » Whether sample compositing has been applied.	» Drilling was completed on existing tracks and newly cleared lines which are 100m to 200m apart, the lines are orientated approximately NW – SE » The holes were spaced approximately 200 meters apart and in some areas were infilled to 100m and 50m centres. » Drill spacing and distribution is sufficient to allow valid interpretation of geological and grade continuity for a Measured Mineral Resource, Indicated Mineral Resource and Inferred Mineral Resource where determined. Drilling has been completed at varying spacings across the Resource Area. » Drill spacing and interpreted geological continuity has allowed three resource categories to be defined which have been estimated in accordance with the JORC Code (2012) and are defined as follows: » **Measured Mineral Resource:** Area with drillholes completed at semi-gridded spacing <150m x 150m ending in basement/water table. » **Indicated Mineral Resource:** Area with drillholes at a confirmatory level spacing (150mx250m) ending in basement/water table. » **Inferred Mineral Resource:** Areas with drillholes at a scout level spacing (250m-400m). » No sample compositing was undertaken.
Orientation of data in relation to geological structure	» Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type. » If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.	» The dune field has ridges dominantly trending 320º - 330°. » The drill access tracks typically run along or sub-parallel to dune ridges which suggest unbiased sampling, some cross-dune tracks linking the ridges were also drilled. » Silica deposition occurs as windblown with angle of rest approximately 35º. Drilling orientation is appropriate for the nature of deposition. » The orientation of the drilling undertaken is assessed to provide representative intersections and unbiased data for the deposit. All drilling is vertical, intersecting the dune field geology essentially normal or at 90 degrees to the dune sand formation. Drilling was undertaken along or sub-parallel to dune ridges. Some cross-dune tracks linking the ridges were also drilled.
Sample security	» The measures taken to ensure sample security.	» Sample collection and transport from the field was undertaken by company Personnel following company procedures. » Samples were aggregated into larger polyweave bags and sealed with plastic zip ties, Bags were labelled and put into palette-crates and sealed prior to being shipped to ALS Townsville. » Samples were delivered direct to ALS in Townsville, where they were transhipped to ALS Brisbane for sample preparation and analysis.
Audits or reviews	» The results of any audits or reviews of sampling techniques and data.	» A review was conducted internally by Metallica Minerals Ltd and a third-party consultant, Ausrocks Pty Ltd, who also reviewed the data prior to undertaking a Mineral Resource estimate.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	» Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings. » The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	» The Cape Flattery Silica Sands Project is located within EPM 25734 in Queensland and is held by Metallica Minerals Ltd through subsidiary company Cape Flattery Silica Pty Ltd. » The project is located in Far North Queensland, approximately 220km north of Cairns or about 50km north of Cooktown and lies within EPM 25734. EPM 25734 is held by Cape Flattery Silica Pty Ltd, a wholly owned subsidiary of Metallica Minerals Pty Ltd and comprises 11 contiguous subblocks covering the very northern end of the extensive Cape Bedford/Cape Flattery dunefield complex. The dunefield complex is characterised by large northwest trending transgressive elongate and parabolic sand dunes, stretching inland from the coastline for kilometres. » A compensation and conduct agreement is in place with the landholder (Hopevale Congress) and native title party. » The tenement is in good standing and there are no impediments to conduct exploration programs on the tenements.
Exploration done by other parties	» Acknowledgment and appraisal of exploration by other parties.	» Previous exploration has been carried out in the area during the 1970's and 80s by Cape Flattery Silica Mines (CFSM). CFSM reported seven (7) holes drilled for 84 meters. These holes intersected sand dunes between 10 and 20 meters in thickness. » The historical exploration data is of limited use since but never assayed for SiO_2 and there is poor survey control to determine exact locations of historical holes. » All current exploration programs are managed by Metallica Minerals.

Criteria	JORC Code explanation	Commentary
Geology	» Deposit type, geological setting and style of mineralisation.	» The CFS Sand 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 geology comprises variably re-worked aeolian sand (silica) dune deposits associated with Quaternary age sand-dune complex. The mineralisation is high grade quartz (silica) and it occurs as sand deposits within an aeolian dune complex. » Cape Flattery Silica Mines, which also lies at the northern end of the dune field, has been in operation since 1967 and is Queensland's largest producer of world class silica and the highest production of silica sand of any mine in the world. » The linear sand dunes developed predominantly during the dry Pleistocene glacial and interglacial periods when the sea-level receded and fluctuated approx. 100m below present. Prior to sea level rises in the Holocene (10,000 years before present) sand was blown inland by the prevailing south-easterly winds to form linear dunes and is now interspersed with numerous lakes and swamps. The land sand masses form mainly as elongate parabolic and longitudinal dunes. Multiple episodes of dune building are evident. Most dunes are stabilised by vegetation, but some active dune fronts occur. Periods of water level table fluctuations, erosion and depositional phases have occurred. » Silica sand Mineralisation occurs within aeolian dune sands.
Drill hole Information	» A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes: » easting and northing of the drill hole collar » elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar » dip and azimuth of the hole » down hole length and interception depth » hole length. » If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the	» A tabulation of the material drill holes used in the Mineral Resource Estimation is attached to the ASX Release 21 October 2021 'Revised: 40% Increase of the Cape Flattery Silica Sand Mineral Resource to 53.5Mt'. » Relative to the previous Mineral Resource Estimate (March 2021), an additional 98 drillholes have been added.

Criteria	JORC Code explanation	Commentary
Data aggregation methods	» In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated. » Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail. » The assumptions used for any reporting of metal equivalent values should be clearly stated.	» The significant intercepts for each drill hole are calculated using a cut off grade of 98.5% SiO2, only intercepts of greater than 3m are considered as significant. » Internal dilution of up to 3m is included in the reported intercepts » A cut-off grade of 98.5% silica has been used for the Mineral Resource Estimation. » The grade is highly consistent, and the aggregate intercepts use a simple arithmetic average. » No top cuts were applied to the data. » No metal equivalents reported.
Relationship between mineralisation widths and intercept lengths	» These relationships are particularly important in the reporting of Exploration Results. » If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported. » If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').	» All drilling was vertical (-90°) intersecting undulating flat-lying aeolian dune sands. » Down hole length correlates with true width. » As the mineralisation is associated with aeolian dune sands the majority sub-horizontal, some variability will be apparent on dune edges and faces.
Diagrams	» Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported. These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.	» A map of the drill collar locations is provided in ASX Release 21 October 2021 'Revised: 40% Increase of the Cape Flattery Silica Sand Mineral Resource to 53.5Mt'.
Balanced reporting	» Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.	» All exploration results are reported in a balanced manner. All results are supported by clear and extensive diagrams and descriptions. No assays or other relevant information for interpreting the results have been omitted.

Criteria	JORC Code explanation	Commentary
Other substantive exploration data	» Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	» Geological observations are consistent with aeolian dune mineralisation. » Groundwater was intersected during drilling at the base of holes, as expected given the dune complex is an aquifer and drilling was undertaken to a maximum depth of 35m. » The relationship of the groundwater to the regional groundwater table is unknown. It is likely that the true groundwater table is well below the termination depth of the current drillholes. » A bulk sample will be composited from the individual samples for metallurgical testwork, this work will commence in Q4. » Iron (Fe_2O_3) in various forms may potentially act as a contaminant for very high-quality "processed" end products. » IHC Robbins completed a bulk laboratory sample in early 2021 to determine the processing requirements and assist in understanding the marketability of a premium sand product. Testing confirmed a product: » between 99.8% and 99.9% SiO_2 » 450ppm Al_2O_3 » 170ppm Fe_2O_3 » 210ppm TiO_2 » 2.6% <125µm particles. » Mass yield of 77.4% » All exploration results detailed in attached report.
Further work	» The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling). » Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	» Further metallurgical testing. » A limited amount of infill drilling may be required to increase the confidence levels in the Mineral Resource prior to a PFS and FS. » The next stage of exploration on the EPM will be to assess the western targets on the EPM utilising Auger sampling, but this work has yet to be planned.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	» Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes. » Data validation procedures used.	» The database was originally constructed, validated and electronically provided by Metallica Minerals to Ausrocks Pty Ltd. » Ausrocks reformatted the database into appropriate file formats checking the veracity of the assay results. The data was further validated and cross checked against the geological logs and the chip tray photographs. » Micromine 2021 validated the files which were used for the Mineral Resource Estimate.

Criteria	JORC Code explanation	Commentary
Site visits	» Comment on any site visits undertaken by the Competent Person and the outcome of those visits. » If no site visits have been undertaken indicate why this is the case.	» A site visit was completed by the Competent Person (B Mutton) from 13th -18th December 200 during the December 2020 drilling program. The visit enabled an appraisal of the dune geology and setting. » A site visit was completed by the C Morandy and C Ainslie on 20th October 2021.
Geological interpretation	» Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit. » Nature of the data used and of any assumptions made. » The effect, if any, of alternative interpretations on Mineral Resource estimation. » The use of geology in guiding and controlling Mineral Resource estimation. » The factors affecting continuity both of grade and geology.	» The CFS project is dominated by several elongate dunes rising in elevation to the northwest. The deposit is by far dominated by high-grade silica (quartz) sand. The sands are mainly very fine-grained and pure white in colour and in places a slight creamy colour. Based on current exploration, the depth of clean white high-grade sand ranges up to a maximum thickness of 35m. The high-grade silica sand overly to varying depths, yellow-orange-brown (coloured) high silica sands mainly representing the podsolised B2 horizon and/or in part, the flatter heavily weathered parts of the basement Devonian and Jurassic age formations. Some drilling intersected coloured sands only and in places several holes intersected coloured interburden. Sand colouration is from surface coating on sand grains of Iron (Fe) rich clay material including Fe_2O_3. It only takes a trace percentage of Fe2O3 to colour the sand, with cream and orange-coloured sands being in excess of 98.5% SiO_2, several intervals below the 98.5% grade are being investigated further to determine viability. In several places these coloured sands are exposed on surface. One hole intersected from surface, a continuous thickness of 38m of coloured silica sand. » The Cape Flattery Silica Sand Deposit has been well defined by drilling and the geological controls are reasonably well understood. » The known nature and formation of the dune sands, together with consistent high silica grades achieved in drillholes, places a high degree of confidence in the geological interpretation. Continuity of geology (chip tray photographs) and grade (assays) can be readily identified and traced between all drillholes. » The interpreted geology of the Cape Flattery Silica Sand Deposit is robust, and any alternative interpretation of the deposit is considered unlikely to have a significant influence on the total Mineral Resource Estimate undertaken. » No major factors affect continuity both of grade and geology. » Geological controls were applied to multiple cross and long sections to constrain the final resource wireframe. » Prior to interpolating and assigning assay values to each block, a solid was generated to model the overall deposit shape and volume by applying the following parameters: » Top surface - defined as the base of topsoil which is 0.5m below surface topography. » Bottom surface – a gridded surface based on drillhole depths and geological interpreted boundary points.

Criteria	JORC Code explanation	Commentary
Geological interpretation		» Boundary – the resource boundary was defined by the following considerations: » Surface dune extents based on imagery and interpretation. » Geological interpretation of drillholes. » The area where the top and bottom surfaces intersected. » Area of influence around drillholes determined by confidence level. » Several iterations were run to cross check boundary sensitivities.
Dimensions	» The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.	» The extent and variability of the Mineral Resource is expressed in terms of the full Resource Area » **Max Length (along strike):** 2.4 km » **Max Width:** 2.2km » **Area:** The Mineral Resource covers an area of approximately 315ha. » **Average Depth:** The average thickness of the total resource within the Resource Area is 17m. » **Top of Resource:** The top of the resource corresponds to the topography ranging from 10mRL to 106mRL. » **Bottom of Resource:** The base of the resource corresponds to basement/water table ranging from 6mRL to 85mRL.

Criteria	JORC Code explanation	Commentary
Estimation and modelling techniques	» The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used. » The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data. » The assumptions made regarding recovery of by-products. » Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation). » In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed. » Any assumptions behind modelling of selective mining units. » Any assumptions about correlation between variables. » Description of how the geological interpretation was used to control the Mineral Resource estimates. » Discussion of basis for using or not using grade cutting or capping. » The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.	» The Mineral Resource Estimate was completed in accordance with JORC 2012 guidelines with Micromine 2021 used to model and evaluate the resource. » Using Micromine 2021, Statistical and Geostatistical analyses was undertaken on silica (SiO_2) and the key impurities (Fe_2O_3, TiO_2, LOI, and Al_2O_3) of the dataset. Assay methods also returned results for Al_2O_3, BaO, CaO, Cr_2O_3, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, SO_3, SrO, TiO_2 but they were not examined due to their very low grades (at or near detection range). » All sample intervals underwent basic statistical analysis (minimum, maximum, mean etc.). All variables showed that there were no requirements for top or bottom cutting. » The raw data distribution for silica and the key impurities (Fe_2O_3, TiO_2, LOI, and Al_2O_3) were analysed in detail and used in the block modelling. » The surface boundary was generated by a combination of the interpreted geological boundaries and Mining Lease boundaries. A topsoil or humus layer of 0.5m was excluded from the model. A 400m limit was used to guide drillhole continuity where information became sparse or non-existent. Multiple cross section iterations were used to further define and constrain the model where data was minimal. » The base of the resource model was determined from selected drillhole depths (silica cut-off), then modelled and adjustments made for intersections with surface topography and other continuity limits. The model was further controlled by cross section checks. » Parent blocks of 10mE (X direction) by 10mN (Y direction) by 1mRL (Z direction) were used with sub-blocking splitting these blocks by 5m in the X direction, 5m in the Y direction and 0.5m in the Z direction. All sub-blocks have the same interpolated values as their parent blocks. » The blocks were constrained by the model boundaries and populated by the Ordinary Kriging (OK) estimation method to interpolate assay grades for each of the chosen elements (SiO_2, Fe_2O_3, Al_2O_3, LOI and TiO_2). Inverse Distance Weighting (IDW - 4:1) was used to check the model and yielded similar results. » The block model was validated by comparing basic statistics and histograms of modeled data (block model) against the input data (drilling data) which showed similar means, range of data and data distribution. Additionally, cross-section throughout the block model were compared with the same sections through the drillhole data showing that the modeling completed was indicative of the input data and the mineralisation. » Grade cutting or capping was not applicable as no SiO_2 values exceeded 100%.
Moisture	» Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.	» All samples were placed into bags and sealed so samples would be received with slightly less than in-situ moisture. » Estimations assume a moisture content of 2.5%.

Criteria	JORC Code explanation	Commentary
Cut-off parameters	» The basis of the adopted cut-off grade(s) or quality parameters applied.	» A silica (SiO_2%) grade cut-off was used to define the in-situ resource to achieve a marketable high purity silica sand. Geological logging and returned assay grades and intersections showed an obvious grade demarcation of ore versus waste at 98.5% SiO_2. This was further supported by statistical analysis and representation. Lengthy continuous vertical intervals of >98.5% SiO_2 was the norm, and these intervals were used for the modelling and Mineral Resource Estimate. The clear in-situ grade demarcation of >98.5% SiO_2 persisted through successive exploration programs, and across the whole of the Mineral Resource Area. » The surface to one (1) metre interval, where assayed, returned a <98.5% silica assay and a higher than normal LOI. This logged interval included topsoil and organic material which caused minor contamination. This one (1) metre interval was adjusted by adopting the succeeding one metre assay (1-2m interval) grade. A topsoil layer from surface (0.0m to 0.5m) was excluded from the Mineral Resource Estimate. » A silica grade cut-off of 98.5% SiO2 is robust and was applied as the cut-off grade for the resource modelling and Mineral Resource Estimate, for all reporting levels.
Mining factors or assumptions	» Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	» It is expected that mining will be conducted with Dozer and Wheel Loader from the face, which will load a grizzly & feed bin. Material will then be conveyed to the processing plant. This mining method is flexible and is considered suitable for the deposit and is not likely to unnecessarily constrain the Mineral Resources. » Dilution was not considered in the Mineral Resource Estimate. In some holes there was minor additional resource below the >98.5% silica floor which is slightly lower grade material and would only marginally dilute the product. » Based on the sample assays and geological logs, the top 0.5m of the deposit has been excluded from the Mineral Resource Estimate as it is assumed that this would be a soil and vegetation layer and would be scalped when mining the deposit and re-used for rehabilitation.
Metallurgical factors or assumptions	» The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.	» Initial Metallurgical testing has been completed, returning results consistent with assumptions. Further metallurgical testing is underway to refine the processing method and to determine specifications for end-products. » The test work demonstrated that the Project's Mineralisation is suitable for processing using conventional, off-the-shelf spiral and attrition techniques to produce a saleable silica product. » A conservative 75% recovery rate is assumed for the processing plant which is preliminary testing and industry benchmarks. » The Metallurgical information collected to date is considered suitably rigorous based on the project's status.

Criteria	JORC Code explanation	Commentary
Environmental factors or assumptions	» Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.	» Environmental considerations were made by referencing overlays as provided by the Queensland Government including Category A, B & C Environmentally sensitive areas as well as wetland areas. » Small zones of potential environmentally sensitive ecology have been identified within the resource area however these have yet to be excluded from any resource figures until these areas have been accurately categorized. » Due to the high-grade nature of the deposit, it is expected that there will be a small portion of tailings produced through processing and thus minimal disposal in the voids.
Bulk density	» Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples. » The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit. » Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.	» Nineteen density measures have been completed over the wider resource area in Feb 2021 returning an average density of 1.6 t/m3 which has been used to convert all volumes to tonnes.
Classification	» The basis for the classification of the Mineral Resources into varying confidence categories. » Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data). » Whether the result appropriately reflects the Competent Person's view of the deposit.	» Drill spacing and interpreted geological continuity has allowed three resource categories to be defined and are defined as follows: » **Measured Mineral Resource:** Area with drillholes completed at semi-gridded spacing <150m x 150m ending in basement/water table. » **Indicated Mineral Resource:** Area with drillholes at a confirmatory level spacing (150mx250m) ending in basement/water table. » **Inferred Mineral Resource:** Areas with drillholes at a scout level spacing (250m-400m). » The result appropriately reflects the Competent Persons view of the deposit.
Audits or reviews	» The results of any audits or reviews of Mineral Resource estimates.	» Previous Mineral Resource Estimates have been completed and reviewed internally by Ausrocks Pty Ltd.

Criteria	JORC Code explanation	Commentary
Discussion of relative accuracy/ confidence	» Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the Mineral Resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate. » The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used. » These statements of relative accuracy and confidence of the estimate	» It is the opinion of the Competent Person that the relative accuracy and confidence level across the reported geological intervals is adequate, given the drill density and continuity of geochemical samples. » The Mineral Resource boundary and the reported geological confidence intervals is relatively tightly constrained based on the drill density, although some further drill definition should be undertaken to better constrain dune sides/perimeters. » No production data is available at present as this is a Greenfields project. However, Cape Flattery Silica Mine lies in the same adjoining coastal dunes immediately to the North, suggesting potential viability.