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DIATREME Resources

ASX ANNOUNCEMENT

9 November 2021

Galalar Maiden Ore Reserve, PFS delivers substantial boost to new Silica Sand mine

Highlights

- Galalar Silica Project's Pre-Feasibility Study (PFS) returns post-tax net present value (NPV_8) of A$358 million, (vs Scoping Study of $158 million) Internal Rate of Return (IRR) of 66% and Life of Mine (LOM) net revenue of A$2.5 billion
- Pre-tax NPV noted as A$495 million, IRR at 74%
- Low initial Capex of A$60.1 million (plus 11% contingency of $7.8 million) with payback period estimated at 1.4 years
- Maiden mineral reserve estimate (JORC 2012) delivered at 32 Mt, sufficient for an estimated 18 years of initial operations (at 1.65 Mt ore processed per annum); total JORC Mineral Resource stands at 75 Mt
- Mine life of 23.5 years scheduled
- Sensitivity and scenario analyses demonstrate Project is financially robust and maintains positive NPV through stress testing with a low economic sensitivity to initial Capex
- Galalar Silica Sand Project is to become a significant employer in the region directly employing 80-85 people, with an estimate of >40% of workers sourced from local communities
- Emphasis on supporting North QLD businesses and Service providers
- Contributions to the local economies in wages, royalties and taxes to exceed $800 million during life-of-mine
- Operations to deliver a single product through selective mining and progressive rehabilitation, resulting in low impact mine with expected annual yield of 1.32 Mt of premium "low iron" SiO_2 product at full production (vs Scoping Study of 0.75 Mt of SiO_2 product per annum)
- Conventional mine extraction and physical separation processing plant with limited footprint, short construction timeline to production
- Results demonstrate potential new mine's benefits for community of Hopevale-Cooktown, delivering new jobs, investment and other economic gains to First Nations and other stakeholders, while supplying Asia's booming solar energy industry
- DFS to be delivered in Q1/Q2 CY2022 to support a final investment decision (FID) by DRX in Q2 CY2022

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Emerging silica sand explorer and high purity silica producer, Diatreme Resources Limited (ASX: **DRX**, Diatreme or the **Company**) has upgraded the potential of its Galalar Silica Sand Project (GSSP), following the delivery of a maiden Ore Reserve and Pre-Feasibility Study (PFS) for the North Queensland New Economy Mineral Development.

The increase in scale and improvements on the 2019 Scoping Study (refer ASX release 9 September 2019), has delivered a substantial upside to the initial forecast on returns for the project; including a post-tax net present value (NPV_8) of A$358 million and a net revenue of A$2.5 billion.

Other improvements on the project's original scoping study include an increase in targeted production (exported product) from 750,000 tonnes to 1.32 million tonnes per annum and a reduction in total costs (C_1 costs – mining, processing and domestic barging). This delivers final product to export point (Cape Flattery Port) reducing C_1 costs from A$58/t to A$34/t, facilitating a greatly improved project viability and delivering long term sustainable economics.

Diatreme's CEO, Neil McIntyre commented:

"We are delighted to announce our maiden Ore Reserve at 32 million tonnes and the exceptional results of our PFS study for our flagship Galalar Silica Project. These results are a substantial upgrade on the previous Scoping Study and highlight how fundamentally robust the project is as we advance through the final stages of the permitting and approvals process.

"Importantly for the local community, the PFS shows how Galalar could deliver long-lasting jobs and other economic benefits to First Nations and other Stakeholders, supporting the region in its post-COVID recovery, with potential for downstream processing in Queensland to capture further value.

"The Asian solar PV market is booming on the back of the solar energy boom, and we are seeing strong demand from the region for Galalar's premium-quality, low iron silica product.

"The Galalar project is truly ready to take its place as one of Queensland's important mining projects as we play our part in Queensland's new economy minerals drive. The opportunity is right here in front of us, and we look forward to advancing this project's development with the support of all Stakeholders."

SUMMARY OF PRE-FEASIBILITY STUDY FINANCIAL EVALUATION

The Galalar PFS was commissioned to determine the required capital expenditure (Capex), operating expenditure (Opex), annual revenue and deliver a project economic evaluation to a PFS level. The intent is to continue the economic assessments through a next step definitive feasibility study (DFS) and reach a financial

investment decision (FID) over the coming two quarters, justifying further investment towards project development and commissioning.

Whilst the 2019 Scoping Study showed favourable economics, including pre-tax NPV of $231 million, IRR 150% and capital payback in eight (8) months, DRX has in the intervening period continued to upgrade its mineral resources (ASX release 28 September 2021) and fundamental project economics. The following table (**Table 1**) summarises the PFS results and key metrics.

Table 1: Key – Life Of Mine (LOM) financial and production outcomes (expressed in $A)

Financials		Mining and processing metrics	
Post-tax ungeared NPV_8 ($m)	**358**	Mineral resources (Mt)	**75**
Post-tax ungeared IRR (%)	**66**	Ore reserve (Mt)	**32**
Pre-tax NPV ($m)	**495**	Tonnes mined (Mt)	**39***
Pre-tax IRR (%)	**74**	Tonnes processed (Mt)	**31**
Payback period (yr)	**1.4**	Average mined (Mtpa)	**1.59**
Exchange rate US$/A$	**0.72**	Plant operating capacity (Mtpa)	**1.65**
Capex ($m- Includes $7.8m contingency)	**67.9**	Recovery (%)	**80**
Sustaining capital LOM ($m)	**35**	Silica product (Mtpa)	**1.26**
Life of mine-FOB costs to Port (C1 -$/t)	**33.9**	Life of mine (yr)	**23.5**
Ocean freight and insurance ($/t)	**25.2**	Ore grade SiO_2(%)	**99.2**
CIF costs ($/t -China market)	**59.1**	Product grade SiO_2(%)	**99.9**
Life of mine Opex ($m)	**1,051**	Ore Fe_2O_3(%)	**0.03**
Life of mine Opex shipping (A$m)	**783**	Product Fe_2O_3(%)	**0.01**
FOB net revenue ($m)	**2,493**	Product sales price (FOB – A$/t)	**81.0**

Notes:

- Model is ungeared on an equity basis
- All figures are presented in Australian dollars, unadjusted for inflation
- Assumed exchange rates US$/A$0.72
- **Based on reasonable expectation to exploit resources identified in the Galalar Dune and extending form the western boundary to current Mineral Resources*
- Engineered process plant maximum capacity is 1.65 Mtpa
- 11% contingency included in Capex estimate
- Mining commences 3 months prior to commissioning at 0.95 Mtpa and ramps up to 1.65 Mtpa at month 3 in operations (initial 6 months at reduced production)
- Processing commences at 0.75 Mtpa output and ramps up to 1.32 Mtpa at month 3 Operations
- DRX is reviewing the commercial justification for constructing an onsite accommodation facility in early mine life at an estimated $3.5-4 million *(excluded from PFS Capital)*
- The Probable Ore Reserve and Measured, Indicated and Inferred Mineral Resource underpinning the above production assumptions targets has been prepared by a Competent Person in accordance with the requirements of the JORC Code 2012

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MAIDEN ORE RESERVE AND REVISED JORC RESOURCE

The Ore Reserve estimate (maiden) has been completed by independent firm Ausrocks Pty Ltd, applying updated inputs on the basis of the PFS financial model. Approximately 43% of the previously defined Mineral Resources (75 Mt) have now been converted to Ore Reserves (refer to **Table 2** and **Table 3**).

There have been ten exploration and drilling campaigns since September 2017 and data from 191 drillholes and 24 hand-auger holes has been used to define the Measured, Indicated and Inferred Mineral Resources in accordance with the JORC Code (2012) at Galalar area (**Figure 1**). The most recent campaign included infill holes in Galalar Main and Galalar East specifically for the Ore Reserve Estimate as well as exploration holes in Galalar Extended.

Table 2: Ore reserves summary at 98.5% SiO_2 cut-off grade

JORC Resource Category	Silica sand (Mt)	Silica sand (Mm^3)	Sand waste (Mt)	SiO_2 %	Fe_2O_3 %	TiO_2 %	LOI %	Al_2O_3 %
Probable ore reserves	**32.5**	20.3	.04	99.20	0.08	0.11	0.16	0.13

Table 3: Resource estimate, September 2021*

JORC Resource Category	Silica sand (Mt)	Silica sand (Mm^3)	Cut-off SiO_2 (%)	SiO_2 %	Fe_2O_3 %	TiO_2 %	LOI %	Al_2O_3 %	Density (t/m^3)
Measured	43.12	26.95	98.5	99.21	0.09	0.11	0.16	0.13	1.60
Indicated	23.12	14.45	98.5	99.16	0.09	0.13	0.24	0.10	1.60
Inferred	9.22	5.76	98.5	99.10	0.11	0.16	0.27	0.11	1.60
Total**	**75.46**	**47.16**	**98.5**	**99.18**	**0.09**	**0.12**	**0.20**	**0.12**	**1.60**

** Resource Estimate current as of 13 September 2021*

*** Total inferred, indicated and measured*

CUT-OFF GRADE

A SiO_2 % grade cut-off was used to define the in-situ resource to achieve a marketable, high-purity silica sand. Geological logging 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 is persistent across the whole resource area.

The surface to one (1) metre interval consistently returned a <98.5% silica assay and retuned higher than normal LOI. The 1 m logged interval included a thin average 0.3 m topsoil and recorded organic material, causing minor contamination, was excluded from the Mineral Resource Estimate. A silica grade cut-off of 98.5% SiO_2 is robust and was applied as the cut-off grade for the resource modelling and Mineral Resource Estimate for all JORC reporting levels.

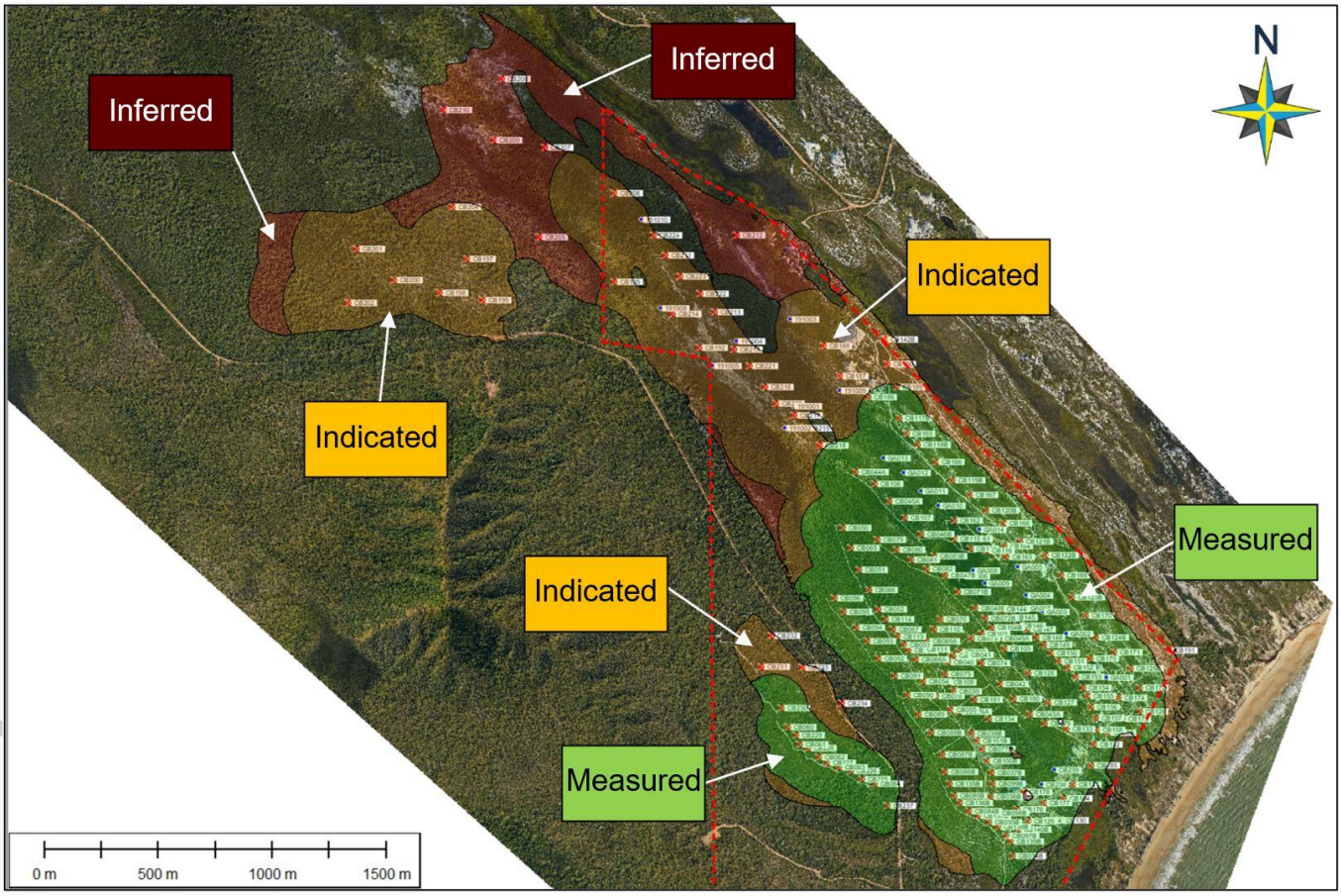

Figure 1: Areas of measured, indicated and inferred mineral resource estimation

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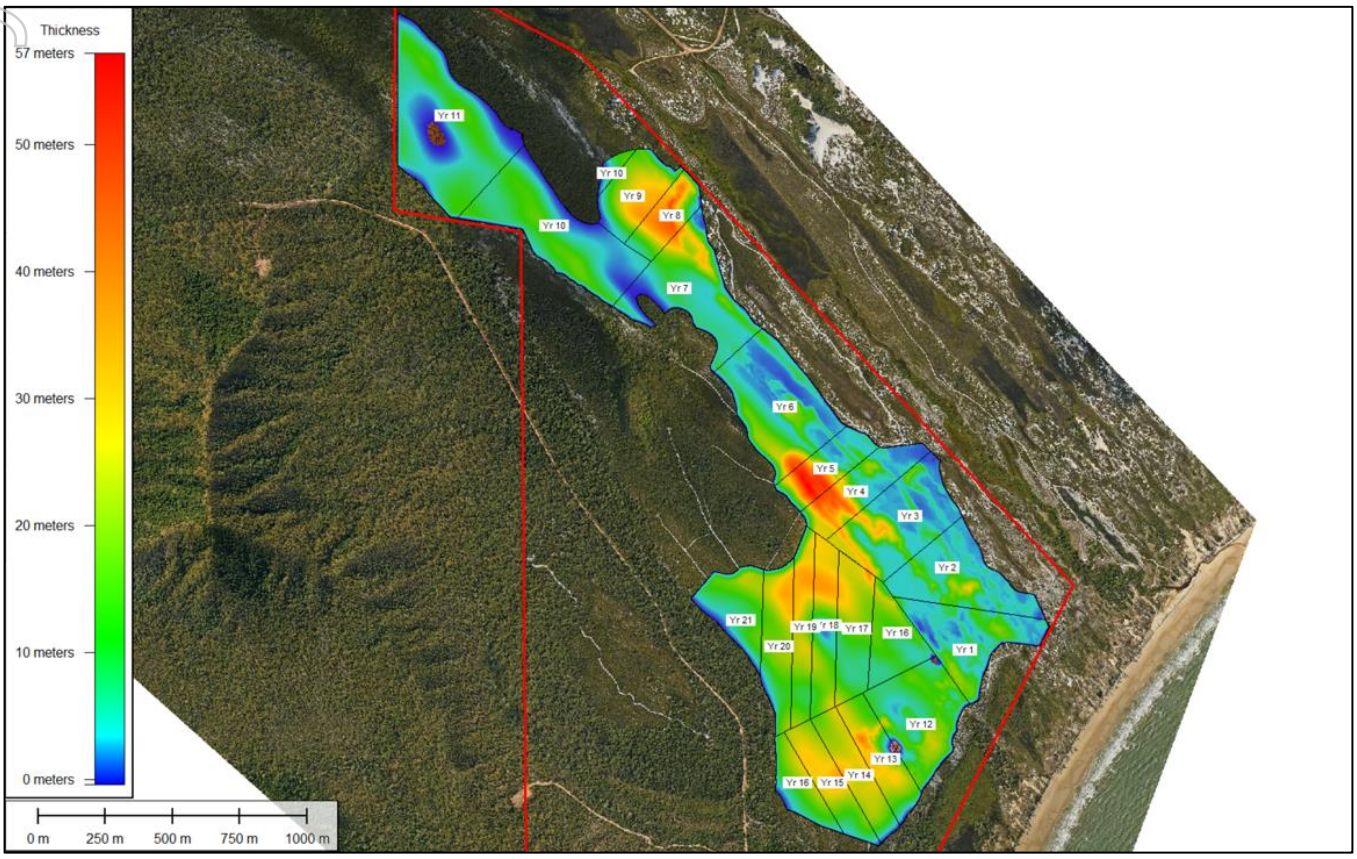

Figure 2: Dune depth and mine panel layout

PFS METALLURGICAL BULK TESTING

Diatreme engaged Mineral Technologies (MT) to complete a Feasibility Study for GSSP, with the objective of developing a mineral process flowsheet enabling engineering plant design to produce high purity silica sand suitable for photovoltaic glass manufacturing. A primary bulk sample was composited from drill samples that had been completed at that time in the area forecast for the first five years of the ore reserve.

Previous process test work by IHC Robbins and Bengbu Design & Research Institute demonstrated that a silica sand product that achieved the specifications for photovoltaic glass manufacture could be produced from selected samples across the mineral resource.

The 870 kg bulk sample was prepared by compositing samples as advised by Diatreme from drilling that had been completed in the initial 5-year mining area. Process characterisation of two variability samples ("LG" and "HG") in parallel with the primary bulk sample showed the Fe_2O_3 content of the silica contained in each sample was similar. All three samples produced a silica sand product in the range 100 ppm to 110 ppm Fe_2O_3. The main difference

between the samples was the higher proportion of fines (-106µm) contained in the LG (8.8%) and HG (5.6%) compared with the test work sample (4.2%).

Metallurgical testing on bulk sample containing 99.6% SiO_2 and 300 ppm Fe_2O_3, produced a silica product containing 99.9% SiO_2 and 105 ppm Fe_2O_3. Additional testing on the spiral middling stream resulted in potential for up to 8% additional yield (total 80%), with a grade of 99.9% SiO_2 and <110 ppm Fe_2O_3. Sizing range for the product is 125-700microns.

Hot acid leach (HAL) tests conducted on silica product indicated it was possible to further reduce the Fe_2O_3 level to ~70ppm. The test method used was a standard Hepworth method involving leaching silica with sulphuric acid at elevated temperature.

Metallurgical studies on final product indicate clean silica grains with minor internal Fe oxide, silicate and rutile-ilmenite inclusions.

Table 4: PFS Bulk sample testing results and final silica product assays

ICP assay (%)	SiO_2	Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	TiO_2	CR_2O_3	LOI
Bulk sample	99.6	0.069	0.002	0.030	0.007	0.003	0.061	<0.001	0.13
Silica product	99.9	0.042	0.004	0.0105	0.004	0.002	0.018	0.0001	0.04

Notes:
- Bulk testing undertaken by independent firm, Mineral Technologies
- Assays undertaken by ALS Labs

MINING

Mining will utilise a loader feeding to trommel, then slurry pumping to processing plant using a process to minimise iron contamination to the exceptionally low-iron silica product. The PFS considered a number of options with an owner managed fleet being the most suitable, cost-effective option. The proposed equipment is considered common for sand mining operations and similar to plant operated by local earthworks contractors and quarry operators.

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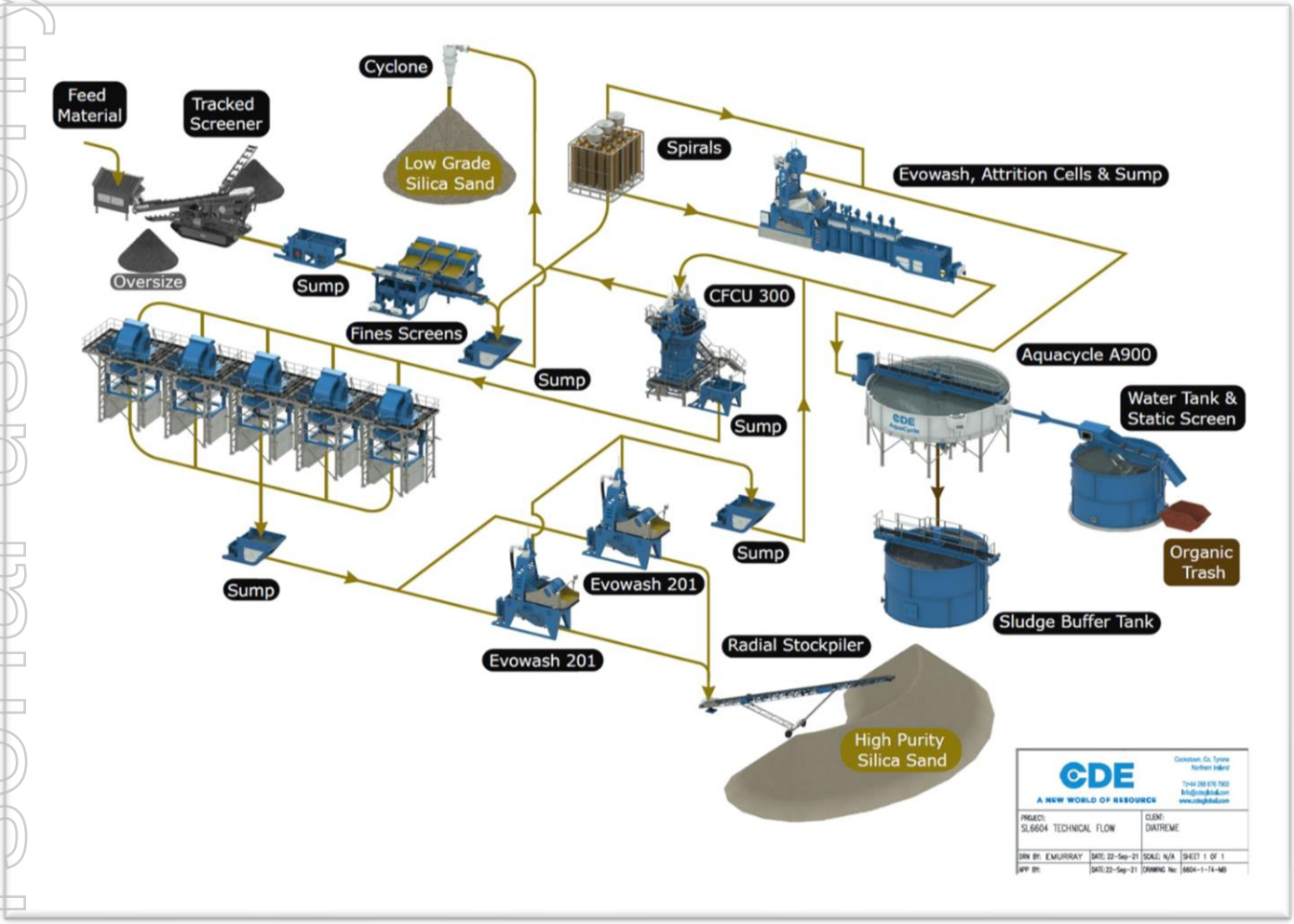

Figure 3: Stylised flowsheet for processing plant

The mining schedule has been developed to prioritise <950 ppm Fe_2O_3 silica sand in the first 10 years, exploiting sand containing 490 ppm-930 ppm Fe_2O_3 with an average of 620 ppm Fe_2O_3. This provides certainty that the proposed plant will operate as designed and deliver product within specification. Year 10 onwards contains on average a higher Fe_2O_3 content, though below 1200 ppm.

Metallurgical testing indicates that material with >1200 ppm Fe_2O_3 can be processed into high grade product at a reduced plant throughput. Rehabilitation requirements will be in line with production, with 20% of material mined returned to the pits.

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CAPITAL EXPENDITURE

The Class 3 (AusIMM) Capital cost estimate (+/-20%) has been prepared based on the project scope of work. The capital cost is A$60.1 million excluding contingency and based on PFS level engineering design, detailed work breakdown structure (WBS) and pricing of owners work packages from vendors.

Material take offs (MTO) were produced for each significant element of scope listing the quantity and scope of works based on engineering drawings and equipment lists. Request for pricing (RFP) packages were prepared from the MTOs and sent out to suitably qualified local and state-wide suppliers and contractors. Pricing received was technically and commercially evaluated independently prior to entry into the estimate.

Mining and other heavy fleet capital costs were reviewed and for the purpose of PFS only the smaller support equipment capitalised. Mining equipment related to processing will be acquired as part of the plant EPC. Operating maintenance costs will be reported based on multiple sand processing plant operations and this data will be updated in the upcoming DFS.

Table 5: Capital cost summary

Work breakdown structure item		$AUD (m)
Mine and processing		**23.3**
Stockpile		**0.7**
Administration service area		**5.1**
Infrastructure		**8.1**
Nob Point Barge Ramp facilities		**7.8**
Other		**1.8**
Owners and indirect		**4.0**
Process plant expansion		**2.8**
Conveyor		**6.6**
Contingency*	11.0%	**7.8**
Total Capex		**67.9**
Total Capex excl. contingency		**60.1**

**Contingency allows for variation in engineering design by CDE Global Australia Pty Ltd (CDE) through the DFS. Overall contingency has been determined at 11% across all disciplines. Contingency will be allocated on a package basis in DFS.*

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MARKETING

Galalar has the capability to become a significant near-term, low-cost and premium quality silica producer required for high-end, solar photovoltaic panel (PV grade) and specialty glass markets. The demand for high quality glass (including PV solar cell covers) is driving increased demand at a time when traditional supply resources are waning.

China now imports approximately 50% of its supply from Australia, up from circa 25% in 2018 and is increasingly looking to offshore suppliers for premium supplies. Japan imports around 70% from Australia and South Korea imports a total of 68%.

Wogen Ltd and other specialist market consultants completed an extensive market investigation for the Company. Extensive engagement with various potential offtake partners and suppliers in China and other markets has been undertaken, including a number of major Asian based commodity trading houses.

The indicative price range identified for a premium PV grade silica product into China market (=> 99.8% SiO_2 and =< 120 ppm Fe_2O_3) was evidenced in the range of RMB 500-600 CIF (cost insurance and freight free out) per tonne delivered (China) , or approximately US$77-$93 per tonne (as at 23 September 2021) variations are noted around some final specification variations, methods of delivery, destination and point of export and shipment volumes. Indicative China sales prices have been calculated into equivalent onshore net (FOB) proceeds for the purposes of analysis.

Table 6: Market assessment – China "low iron" PV grade silica product indicative price range

	High case					Mid case					Low case				
	RMB	E/R	USD	E/R	AUD	RMB	E/R	USD	E/R	AUD	RMB	E/R	USD	E/R	AUD
CIFFO (China port)	600	6.45	93	0.72	129	550	6.45	85	0.72	118	500	6.45	78	0.72	108
Less Ocean Freight/Shipping/Insurances	-110	6.45	-17	0.72	-24	-110	6.45	-17	0.72	-24	-110	6.45	-17	0.72	-24
FOB proceeds	490	6.45	76	0.72	106	440	6.45	68	0.72	95	390	6.45	61	0.72	84

For the purposes of analysis and economic assumptions, DRX has taken a conservative view on market pricing and has used for its analysis an equivalent product price achieved at a further discount to the "low case" product sales price of 490 RMB delivered CIF China. For the PFS financial model, the Company has also assumed an equivalent FOB onshore price of AUD$81 (USD$58 equivalent) net of costs to transport (ship) to market.

DRX notes shipping costs are abnormally high in the current market but has used 5-year forward projections from independent shipping consultants based on "normalised" projections.

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The principle future market drivers are:

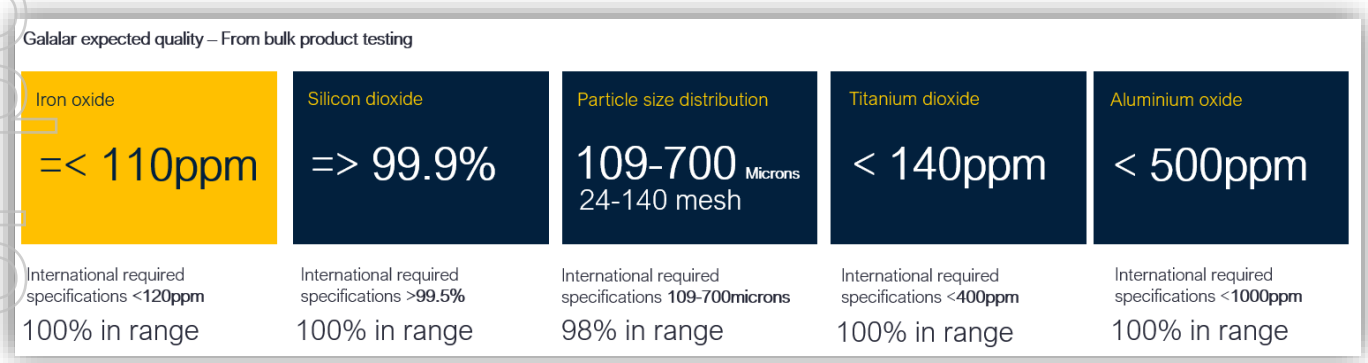
- The global silica sand market is estimated to grow from US$8 billion in 2019 to US$20 billion by 2024; the Asia-Pacific region is the fastest growing with potential to reach US$8 billion by 2026
- Supply is diminishing as a lot of the sand used in Asia comes from rivers where environmental concerns are increasingly restricting extraction
- No direct substitutes exist for the majority of applications
- The solar panel PV market is forecast to reach US$48.2 billion by 2025, with a CAGR of 34.7%
- The World Bank estimates global renewable capacity will grow by over 1 TW from 2018 to 2023, up 46%, with solar PV accounting for more than half of this growth

Relative size of end markets:

- The Asian glass industry is the largest and shows the highest growth for high-grade silica sand
- China is the largest market, with other important markets including Japan, South Korea and Taiwan
- The PV solar panel glass cover industry is experiencing exponential growth

Whilst DRX notes enormous appetite in China markets for its PV grade product, as China continues to dominate world-wide the production of solar panels, it intends to de-risk geographic offtake risk where possible through access to other Asian markets (Japan , Korea and Taiwan & others). The Company is also actively examining the potential for onshore processing of the silica product (domestic PV grade glass manufacturers) for use in solar panel manufacturing regionally with various interested parties and highly supportive State Government agencies.

These opportunities will be explored further through the DFS process and closer to actual mining activity.



Final product specification summary

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ENVIRONMENTAL, SOCIAL AND GOVERNANCE

DRX has benchmarked the Galalar project against two internationally recognised standards for sustainability for the mining industry. These are the Initiative for Responsible Mining Assurance (IMRA) Standard for Responsible Mining (2018) and the Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability (IS) Rating Tool. Environmental, social and governance (ESG) and sustainability planning are underway for the site during construction and operation.

The Company is committed to managing potential impacts to community social values and implementing reasonable mitigation measures. The Company will continue to collaborate with local and regional organisations to support and enhance community social values. The Social Impact Management Plan (SIMP), including detailed action plans will be finalised and approved in Q4 2022. This will allow for approximately a 10-12 month development and consultation period.

PROJECT RISKS

The principal risks identified within the PFS study are:

- Social and Environmental License to operate
- Finalisation of environmental and mine lease permitting (approvals from various State and Federal regulatory agencies on terms acceptable to the Project)
- Stabilisation of shipping freight costs and potential disruptions to shipping during operations
- Market pricing on premium silica products
- Fuel and personnel costs

Mine operations and processing risks will reduce once the plant design is finalised; however, the residual risk on the plant reaching nameplate and hence delivering on product quality remains. The Capex estimate risk will reduce in the DFS post tendering, whilst growth is not considered a high risk when considering the high level of detail in PFS costing and the modular package approach to the processing plant and associated infrastructure.

Capital cost growth is not considered a high risk as a result of detailed costings in the PFS costing and the modular package approach to the processing plant and associated infrastructure. Marketing and shipping risk will reduce in the DFS, once offtake is secured and market pricing is further assured.

Health, Safety, Environment and Community (HSEC), recognised as key business considerations, are rated high at present given the consequence ratings if Diatreme fails to meet the required standards or in the event of non-compliance. The EIS comprehensively reviews risks which will be included in the overarching site operational risk assessments.

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Although different functional, technical and project-stage risks and opportunities exist, the basic process to identify and manage all risks and opportunities is integrated to the Site Safety Management Systems.

Risk Note: The Company notes the Project is highly reliant on its progression through a complex permitting and approvals process with State and Federal regulatory agencies and authorities. Whilst confident in its approach and that appropriate risk mitigation has and will be undertaken during the submissions process, there are risks that approvals will not be granted consistent with targeted commercial timelines as indicated.

NEXT STEPS

The PFS technical and outstanding financial results deliver the justification for immediate advancement into the DFS to enable confirmation of project economics via a final tendering process. Justification for a final investment decision (FID) by the Company is expected to be delivered in Q2 2022.

FURTHER SUPPORTING INFORMATION ATTACHED

Included with this announcement are supporting slides titled "The Galalar Silica Project Pre-Feasibility Study – Summary Outcomes" which contain detailed information about the PFS and its outcomes. This information includes, as applicable, the material assumptions, underlying methodologies and detailed reasoning supporting and used to derive the financial and production outcomes and other forward-looking statements set out in this release (including above), such as the material price and operating cost assumptions. Accordingly, this announcement should be read together with these supporting slides.

Diatreme has concluded that it has a reasonable basis for providing the forward-looking statements set out in this release. This includes a reasonable basis to expect that the Company will be able to fund development of the Galalar project when required. The disclaimer and important notices on page two of the supporting slides also apply to this announcement.

This announcement was authorised for release by the Board of the company.

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About Diatreme Resources

Diatreme Resources (ASX: DRX) is an emerging Australian producer of mineral and silica sands based in Brisbane. Our key projects comprise the Galalar Silica Project in Far North Queensland, located next to the world's biggest silica sand mine, together with the Cyclone Zircon Project in Western Australia's Eucla Basin, considered one of a handful of major zircon-rich discoveries of the past decade.

For more information, please visit diatreme.com.au

References to previous ASX releases:

- Galalar scoping study emphasises high return potential – 9 September 2019
- High priority northern exploration targets – 28 September 2021

FORWARD LOOKING STATEMENTS

This document may contain forward looking statements. Forward looking statements are often, but not always, identified by the use of words such as "seek", "indicate", "target", "anticipate", "forecast", "believe", "plan", "estimate", "expect" and "intend" and statements that an event or result "may", "will", "should", "could" or "might" occur or be achieved and other similar expressions. Indications of, and interpretations on, future expected exploration results or technical outcomes, production, earnings, financial position and performance are also forward-looking statements.

The forward-looking statements in this presentation are based on current interpretations, expectations, estimates, assumptions, forecasts and projections about Diatreme, Diatreme's projects and assets and the industry in which it operates as well as other factors that management believes to be relevant and reasonable in the circumstances at the date that such statements are made.

The forward-looking statements are subject to technical, business, economic, competitive, political and social uncertainties and contingencies and may involve known and unknown risks and uncertainties. The forward-looking statements may prove to be incorrect. Many known and unknown factors could cause actual events or results to differ materially from the estimated or anticipated events or results expressed or implied by any forward-looking statements. All forward-looking statements made in this presentation are qualified by the foregoing cautionary statements.

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Other than as required by law and the ASX Listing Rules, Diatreme disclaims statements to reflect new developments.

MINERAL SANDS AND SILICA – COMPETENT PERSON STATEMENTS

The information in this report that relates to Exploration Results and Exploration targets from the Galalar Silica Sand Project is based on information reviewed and compiled by Mr. Neil Mackenzie-Forbes, a Competent Person who is a Member of the Australian Institute of Geoscientists. Mr. Mackenzie-Forbes is a director of Sebrof Projects Pty Ltd (a consultant geologist to Diatreme Resources Limited). Sebrof Projects Pty Ltd have been engaged by Diatreme Resources Limited to prepare this independent report and there is no conflict of interest between the parties.

Mr. Mackenzie-Forbes has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity for which he is undertaking to qualify as a Competent Person as defined in the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (The JORC Code).

Mr. Mackenzie-Forbes consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The information in this report that relates to Mineral Resources at the Galalar Silica Sand Project is based on information, geostatistical analysis and modelling carried out by Mr Chris Ainslie, Project Engineer – Mining & Quarrying. Mr Ainslie is an employee of Ausrocks Pty Ltd and a Member of the Australasian Institute of Mining & Metallurgy. Mr Ainslie worked under the supervision of Mr Carl Morandy, Mining Engineer who is Managing Director of Ausrocks Pty Ltd and a Member of the Australasian Institute of Mining & Metallurgy and Mr Brice Mutton, Senior Geologist who is an Associate of Ausrocks Pty Ltd and is a Fellow of the Australasian Institute of Mining & Metallurgy and a Fellow of The Australian Institute of Geoscientists.

Ausrocks Pty Ltd have been engaged by Diatreme Resources Limited to prepare this independent report and there is no conflict of interest between the parties.

Mr Mutton has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity for which he is undertaking to qualify as a Competent Person as defined in the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves

(The JORC Code). Mr Mutton consents to the inclusion in the report on the matters based on their information in the form and context in which it appears.

The information in this report that relates to Ore Reserves at the Galalar Silica Sand Project is based on information reviewed or work undertaken by Mr Carl Morandy, Mining Engineer & Managing Director. Mr Morandy is the Managing Director of Ausrocks Pty Ltd and a Member of the Australasian Institute of Mining & Metallurgy. Mr Morandy has relied on Diatreme for marketing, environmental, economic, social and government permitting. Ausrocks Pty Ltd have been engaged by Diatreme Resources Limited to prepare this independent report and there is no conflict of interest between the parties.

Mr Morandy has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the preparation of mining studies to qualify as a Competent Person as defined in the 2012 edition of the Australasian Code for Reporting of Ore Reserves (The JORC Code). Mr Morandy consents to the inclusion in the report on the matters based on their information in the form and context in which it appears.

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DIATREME Resources

GALALAR SILICA PROJECT PRE-FEASIBILITY STUDY

OCTOBER 2021

DIATREME RESOURCES LIMITED – PFS SUMMARY

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DISCLAIMER & IMPORTANT NOTICES

CAUTIONARY STATEMENTS AND RISK FACTORS

This document is prepared by Diatreme Resources Limited (DRX) reporting various technical and economic conditions at the time of writing. Given the nature of the resources industry, these conditions can change significantly over relatively short periods of time. Consequently, actual results may vary from those contained in this document.

Some statements in this document regarding estimates or future events are forward forward-looking statements. They include indications of, and guidance on, future earnings, cash flow, costs and financial performance. Forward-looking statements include, but are not limited to, statements preceded by words such as “planned”, “expected”, “projected”, “estimated”, “may”, “scheduled”, “intends”, “anticipates”, “believes”, “potential”, "predict", "foresee", "proposed", "aim", "target", "opportunity". “could”, “nominal”, “conceptual” and similar expressions.

Forward-looking statements, opinions and estimates included in this document are based on assumptions and contingencies which are subject to change without notice, as are statements about market and industry trends, which are based on interpretations of current market conditions.

Forward-looking statements are provided as a general guide only and should not be relied on as a guarantee of future performance. Forward-looking statements may be affected by a range of variables that could cause actual results to differ from estimated results and may cause the Company’s actual performance and financial results in future periods to materially differ from any projections of future performance or results expressed or implied by such forward forward-looking statements. There can be no assurance that actual outcomes will not materially differ from these forward forward-looking statements.

These statements are subject to significant risks and uncertainties that include but are not limited those inherent in mine development and production, geological, mining, metallurgical and processing technical problems, the inability to obtain and maintain mine licenses, permits and other regulatory approvals required in connection with mining and processing operations, competition for among other things, capital, acquisitions of reserves, undeveloped lands and skilled personnel, incorrect assessments of the value of projects and acquisitions, changes in commodity prices and exchange rate, currency and interest rate fluctuations and other adverse economic conditions, the potential inability to market and sell products, various events which could disrupt operations and/or the transportation of mineral products, including labour stoppages and severe weather conditions, the demand for and availability of transportation services, environmental, native title, heritage, taxation and other legal problems, the potent potential inability to secure adequate financing and management's potential inability to anticipate and manage the foregoing factors and risks. There can be no assurance that forward forward-looking statements will prove to be correct.

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DIATREME Resources

Cooktown **Nob Point** **GSSP**

Galalar expected quality – From bulk product testing

Iron oxide	Silicon dioxide	Particle size distribution	Titanium dioxide	Aluminium oxide
=< 110ppm	=> 99.9%	109-700 Microns 24-140 mesh	< 140ppm	< 500ppm
International required specifications <120ppm	International required specifications >99.5%	International required specifications 109-700microns	International required specifications <400ppm	International required specifications <1000ppm
100% in range	100% in range	98% in range	100% in range	100% in range

Silica is considered a 'new economy' mineral and is critical in the supply chain for existing and emerging high-tech products and applications (e.g. mobile phones, flat screen monitors). Importantly, silica is a key component of solar panels and thus is a key element in the development of global renewable energy

The importance of developing silica as a new economy mineral is already recognised under State and Commonwealth mineral strategies, including the *New Economy Minerals Strategy 2019* (DNRME 2019) and *Australia's Critical Minerals Strategy 2019* (DIIS 2019)

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OVERVIEW

Diatreme Resources Limited (Diatreme or DRX) is a publicly listed company on the Australian Securities Exchange (ASX). The company has been listed since June 2005, and as at September 2021 has a market capitalisation of $66.3M. The flagship Galalar Silica Sand Project (GSSP) located in Far North Queensland provides an opportunity for development of multiple mining, and processing operations. Bulk product export through the nearby Cape Flattery Port initially utilises Panamax and then Supramax vessels (OGV's), delivering into Asian markets.

The GSSP is located 20km north of Hope Vale township by road and is approximately one hour from Cooktown. Diatreme holds a dominant exploration position in the known silica province covering over 500km^2.

The Pre-Feasibility Study (PFS) builds on the 2019 Scoping Study which confirms a strong outlook based on a high-purity, low iron product, a low-cost operation with the ability to generate strong financial returns. The PFS also represents a milestone in Diatreme's strategy to become a key and environmentally sustainable supplier of premium-quality silica to Asia's fast growing solar PV industry. Possible barging of silica product to Townsville for downstream beneficiation represents an emerging domestic market, requiring further review in Definitive Feasibility Study (DFS).

HEADLINE PFS RESULTS:

- The GSSP Pre-Feasibility Study (PFS) returns post-tax net present value (NPV_8) of A$358 million, (vs Scoping Study of $158 million) Internal Rate of Return (IRR) of 66% and Life of Mine (LOM) net revenue of A$2.5 billion
- Pre-tax NPV noted as A$495 million, IRR at 74%
- Low initial Capex of A$60.1 million (plus 11% contingency of $7.8 million) with payback period estimated at 1.4 years
- Maiden mineral reserve estimate (JORC 2012) delivered at 32 Mt, sufficient for an estimated 18 years of initial operations (at 1.65 Mt ore processed per annum); total JORC Mineral Resource stands at 75 Mt
- Mine life of 23.5 years scheduled
- Sensitivity and scenario analyses demonstrate Project is financially robust and maintains positive NPV through stress testing with a low economic sensitivity to initial Capex
- Exploration upside on the basis of recent continued drilling at GSSP, with an estimated 20% of the Galalar sand dune field extent drilled to resource category
- Process Design Criteria (PDC) delivers a single high-purity silica product through selective mining and progressive rehabilitation, resulting in a low impact mine with an annual yield of 0.75Mt, ramping up to 1.32Mt
- Minimal footprint conventional mine extraction and physical separation processing plant, which may be easily expanded or replicated to allow multiple ore source extraction.

The PFS technical and financial results deliver the justification for advancing the Definitive Feasibility Study, to enable confirmation of GSSP engineering and project economics. Subject to DFS results, the justification for FID is expected to be delivered in late Q1-Q2, 2022.

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Life of Mine (LOM) Financials and Project Metrics

Financials		Mining and Processing Metrics	
Post-Tax ungeared NPV_8 ($m)	358	Mineral Resources (Mt)	75
Post-Tax ungeared IRR (%)	66	Ore Reserve (Mt)	32
Pre-Tax NPV ($m)	495	Tonnes mined (Mt)	39*
Pre-Tax IRR (%)	74	Tonnes processed (Mt)	31
Payback period (yr)	1.4	Average mined (Mtpa)	1.59
Exchange rate US$/A$	0.72	Plant operating capacity (Mtpa)	1.65
Capex ($m)	67.9	Recovery (%)	80
Sustaining Capital LOM ($m)	35	Silica product (Mtpa)	1.26
LOM-FOB costs (C1 -$/t)	33.9	Life of Mine (yr)	23.5
Ocean freight and insurance ($/t)	25.2	Ore grade SiO_2(%)	99.2
CIF Costs ($/t)	59.1	Product grade SiO_2(%)	99.9
LOM Opex ($m)	1,051	Ore Fe_2O_3(%)	0.03
LOM Opex shipping (A$m)	783	Product Fe_2O_3(%)	0.01
FOB Net Revenue ($m)	2,493	Product sales price (FOB – A$/t)	81.0

**Based on reasonable expectation to upgrade mineral resources drilled in the Galalar Dune and extending from the western boundary of the current Mineral Reserve*

Further key points include:

- Model is ungeared on an equity basis
- All figures are presented in Australian dollars, unadjusted for inflation
- Assumed exchange rates US$/A$0.72
- 11% contingency of $7.8m included in Capex estimate
- The Probable Ore Reserve and Measured, Indicated and Inferred Mineral Resource underpinning the above production assumptions targets has been prepared by a Competent Person in accordance with the requirements of the JORC Code 2012
- Mining commences 3 months prior to commissioning at 0.95 Mtpa and ramps up to 1.65 Mtpa at month 3 in operations (initial 6 months at reduced production)
- Processing commences at 0.75 Mtpa output and ramps up to 1.32 Mtpa at month 3 Operations
- DRX is reviewing the commercial justification for constructing an onsite accommodation facility in early mine life at an estimated $3.5-4 million (excluded

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from PFS Capital)

- Bathymetry on a transfer anchorage indicates optimal ocean depths for OGV's and Marine Infrastructure within the limits of the Cape Flattery Port area
- On the basis of initial engineering advise and subject to approval from Port Authorities and regulators; $7.5m has been estimated in sustaining Capital towards upgrading transhipment mooring dolphins, effectively extending the Cape Flattery Wharf
- Export infrastructure located at Nob Point Barge Ramp (NPBR) includes a co-located Hope Vale Aboriginal Community boat ramp
- The Environmental Impact Statement (EIS) and associated mine permitting are advancing, with expected delivery in Q2-Q3, 2022
- Sustainability commitments to be integrated across the business to international standards, which include:
    - Environmental Net Improvements and carbon neutral footprint
    - Alignment to the Reef 2050 Long-Term Sustainability Plan

The GSSP is an important initiative in the broader development of new economy minerals for Australia and the transition towards a lower carbon world. The greenhouse gas impact of the project has been assessed, including both Scope 1 and 2 emissions (EIS), based on a worst-case scenario of the use of fossil fuels. A net benefit on global emissions is estimated, in comparative to an equivalent coal-mining project due the GSSP delivery of silica specifically for end use in solar panels, further reducing the ongoing requirement for coal-fired power.

The design, construction and operation of the GSSP is being informed by detailed environmental, social and cultural heritage studies which have been undertaken to ensure impacts are avoided or mitigated. Extensive stakeholder engagement has been undertaken throughout all phases of the GSSP development and there will be ongoing opportunity for involvement within the project, especially from Native Title and tenure holders. Benefits are delivered to the Hope Vale Aboriginal Community through equity contributions, partnership, royalties, employment, sustainable business and community programs.

Headline Contributions to Government, Native Title Parties and Hope Vale-Cooktown Economies

Estimated Contributions (Life of Mine)	($m)
Mine Employment (Salaries , >40% estimated in Hope Vale)	300
Royalties – Native title	24
Royalties – Government (% returns to native title holders on application)	8
Other Native title party revenues (Est. from Project equity)	122 (44- NPV)
Tax	362

Diatreme is committed to investing initiatives to reduce emissions and will also ensure progressive rehabilitation of the mine site. The ecological footprint of the GSSP on water resources is low and has been further minimised through the capture and treatment of project discharges, the reinjection of excess groundwater used in operations, and the close monitoring of groundwater to ensure no short or long-term adverse impacts on groundwater supply.

Multiple large, high-purity SiO_2 sand dune systems extending 60km from Cape Bedford to Cape Flattery. Selective exploration and mining is targeting high purity silica sand, whilst minimising impacts on high value environmental areas. This has the potential to deliver additional projects in the regions which complement the GSSP.

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The Environmental Impact Study (EIS) public lodgement process and detailed studies that are released for review and comment at that time will outline in broader detail the environmental risk management issues including related risk mitigations regarding loading of final silica product from marine loading infrastructure to barging operations , transport on barge within the marine park area (within established shipping channels) and then loading from barge to receiving vessel within the designated Port area at Cape Flattery. At all times environmental risks are effectively managed and monitored to give effect to negligent environmental risk through careful design of related infrastructure (loading, transport) and implementation of rigorous procedures around all related activities. This is further assisted by the benign (inert silica sand) nature of the product being loaded and transported.

Conceptual Galalar Silica Sand Project and Rehabilitation at Year 15

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GSSP DESCRIPTION

During early planning the GSSP was named the Cape Bedford Silica/HM Project. The word 'Galalar' is derived from the Guugu Yimithirr word 'Gaalala' – a 'small bush plant with an edible root.'

The Galalar sand dune is part of a large sand dune system that extends 10km inland, is up to 2km wide and up to 100m in height. The initial project occupies the southern 2km of this dune system where it rises from the current coastline. The higher purity silica sand is mobile and the current dunes reflect the historic leaching and reworking of sand.

Diatreme has contributed in excess of $8mill exploring, evaluating and completing project development studies within awarded tenements (EPM17795 and EPM 27265) and has lodged applications noted as EPMA 27430 and EPMA 27212. MLA 100235 includes the proposed mine. MLA 100825 covers the pr5oposed export infrastructure at Nob Point via the Nob Point Barge Ramp (NPBR).

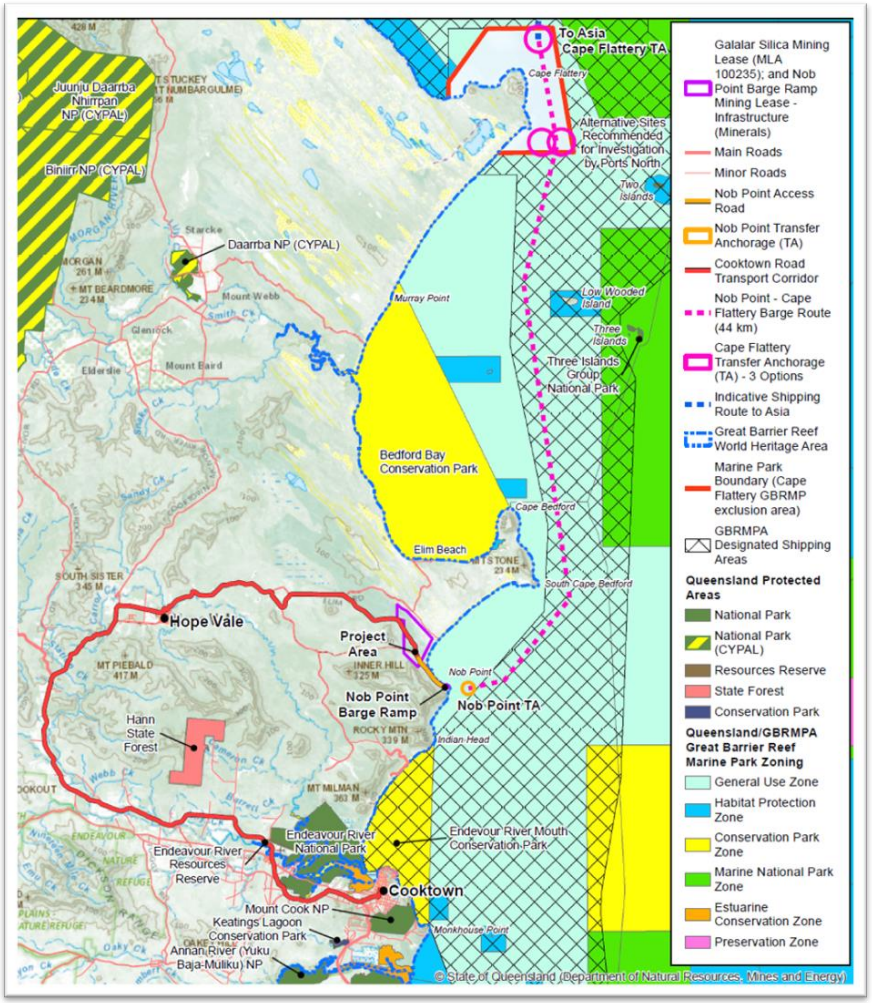
Mine extraction areas and associated mine infrastructure includes the water supply borefield, stockpile areas, processing plant, workshop, offices and laboratory.

The existing road between the mining area and Hope Vale includes a designated mine access between the western limit of the ML and the intersection with the gazetted Elim (Beach) Road, then other roads west to Hope Vale. The mine access road joins the Cooktown-McIvor River road which in turn links to the Endeavour Valley road and provides access to Cooktown. This network connects to locations to the south via the Mulligan Highway (a State Controlled Road)

Early project development considered an option to transport the silica product by road haulage to Marton, on the Endeavour River upstream from Cooktown, from where it would be transported by barge to an offshore loading area off Cooktown. Following initial assessment this option was sub optimal.

Barge loading infrastructure at NPBR is located 3.6 km south of the mine. A new access road is planned between the mine and the loading infrastructure (Nob Point Access Road or NPAR).

Project Location, Mine Lease, Terrestrial and Marine Zones



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SCOPING STUDY PFS COMPARISON

Whilst the 2019 Scoping Study indicated favourable project economics, including pre-tax NPV_{10} at $231m, IRR-150% and capital payback in 8 months; Diatreme has continued to explore, upgraded mineral resources, project economics and refine product delivery solutions.

The comparison of Scoping Study to PFS indicates the following:

- Procurement and Construction period of 12 months (includes 4 month on site installation)
- Mineral resource increased by 248% to 75Mt and Maiden Ore Reserve at 32Mt, delivering 23.5 years initial mine life, an increase of 157%
- Total Mining volume increased by 168% to 1.65Mt and Processing recovery at 80% returning final product of 1.32Mtpa, up 282%
- Nil reduction in product quality at 99.9% SiO_2 and <110ppm Fe_2O_3
- Post Tax ungeared NPV_8 has increased by 227% to A$358m ($NPV_{10}$ in Scoping Study)
- IRR reduced to 66% due to increased Capex at $60.1m representing a 308% increase – Increase due to the introduction of fully costed conveyor product delivery solution to barging, transhipping. Larger process plant capacity and PFS contingency at $7.8m (11% average)
- C1 (FOB) operating costs below similar operations at $33.9/t, 61% lower than Scoping Study, principally due to economies of scale and revised logistics solution through use of Nob Point barge ramp option.
- Total CIF costs including shipping (from Cape Flattery port to market) $59.1/t
- Low duration for ROI at 1.4 years up 156%
- LOM net revenue increased by 207% to A$2.5 billion
- Government royalties, Native Title party equity and royalties fully costed in PFS financial model
- Annual product sales at 1.32Mtpa with marketing offtake agreements to be finalised

Financials (LOM)	PFS	Scoping Study	Var (%)
Post Tax, ungeared NPV_8 ($m) , Scoping Study NPV_{10} ($m)	358	158	227%
Post Tax, ungeared IRR (%)	66	107	62%
Capex ($m)	60.1	19.5	308%
Capex contingency (PFS-11%) ($m)	7.8	4.9	159%
Sustaining Capital LOM ($m)	35	3.7	946%
FOB costs (C1 -$/t)	33.9	55.4	61%
CIF costs ($/t)	59.1	NA	NA
LOM Opex ($m)	1,051	623	169%
LOM Opex ($m)-Shipping	783	N/A	NA
LOM Net Revenue ($m)	2,493	1,205	207%

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PFS PARTNERS & CONTRIBUTORS

The PFS has evolved during completion to the Environmental Impact Study and utilised a comprehensive database of information. Preliminary engineering, detailed vendor pricing and cost build in PFS has delivered a platform for refining project economics. The DFS process will upgrade engineering design.

Advancement in PFS includes:

- Updates and improved confidence in metallurgy, mineral resource and mine design
- Maiden ore reserve
- Detailed planning and reject sand scheduling on progressive rehabilitation
- Mining fleet options study on acquisition v's leased and dry hire options
- Power solutions analysis
- Determining regional vendor support and costs
- Detailed engineering study on processing plant and advancement to detailed design for DFS
- Negotiated equity and royalty agreements with traditional Owners as a consequence to advancement of the Mining Project Agreement (MPA)
- Marine infrastructure evaluation and refinement of associated marine operational costs
- Study and costing on optimised NPBR product stockpile and barge management system
- Review of design and costs for NPBR infrastructure
- Market analysis and offtake partner MOU's
- Development of initial ESG protocols.

PFS - Principal Contributors	Discipline
Environment North	Environmental Impact Study
BMT	Specialist Marine and Environmental Studies
Golder Member of WSP	Specialist Groundwater Assessment and Modelling
Biotropica Australia Pty Ltd	Specialist Terrestrial Environmental Surveys
Pandanus Environmental	Post Closure Rehabilitation Planning, Community Engagement
Tetra Tech Coffey	Social Impact Assessment
Ausrocks Consulting Mining Engineers	Mineral Resources and Reserves
wave international	Engineering, Conveyor and Marine Engineering
Mineral Technologies / Downer	Preliminary Process Engineering Design
	Product Marketing Analysis China Markets
Blackbird Partners	Financial Modelling
Axiom Project Services Pty Ltd	PFS Estimating and Engineering Project Services
McCullough Robertson Lawyers	Legal Advisors and Native Title Mining Project Agreement
Archaeo / Converge	Archaeology and Cultural Heritage
Ports North	Marine Port MOU and utilisation
republic	External communications
CDE	Detailed Process Plant Design /EPC - DFS

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MARKETING

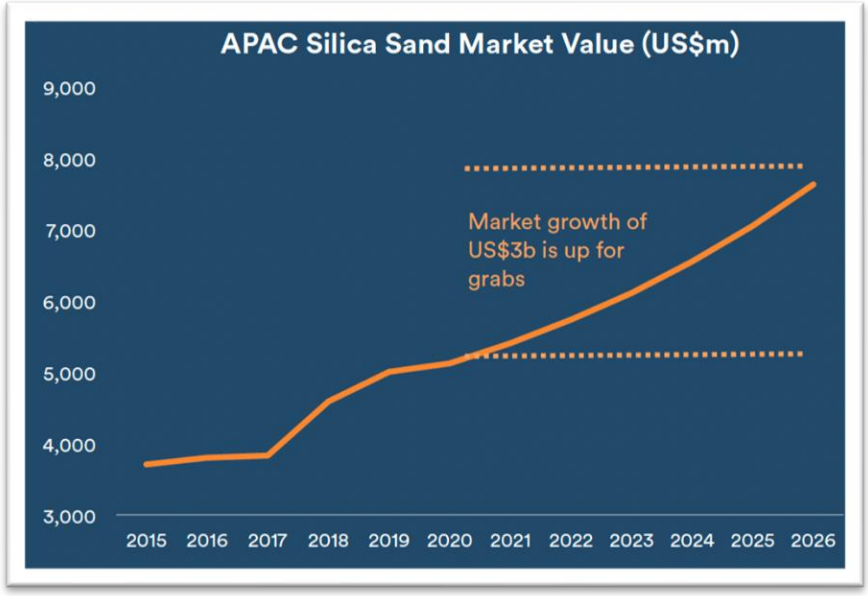
The silica sand market is experiencing increasing demand from emerging consumers such as China and India, to supply the foundry, automotive and solar PV market. Approximately 70% by weight of every standard commercial solar panel utilises specialised covering glass. The low iron specification increases the glass transparency and power generation efficiencies when used in solar panels.

The characteristics needed in this silica product include low iron (ideally sub or no more than 100ppm, though manufacturers are currently using in the 100-120ppm range), correct particle size range and low levels of other key contaminants. The GSSP product, confirmed through various bulk product testing programs, meets and exceeds these manufacturing requirements. Diatreme has existing commitments under non-binding MOU's with various Chinese parties to supply 1.5Mt per annum, indicating the potential for significant increases to required supply to market.

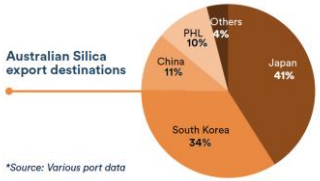
Approximately 80% of the world's solar panels manufactured in China supply Chinese manufacturers, due to limited domestic supply sources. China is increasingly looking to offshore suppliers of premium silica product.

Wogen Ltd and other specialist market consultants to Diatreme have completed extensive market investigations and engagement with various potential offtake partners and suppliers in China. The indicative price range for product currently into China is variable within a range of **RMB 500-600 CIF** per tonne delivered major port (Quindao), or approximately **US$77 – US$93** (as at 23 September 2021). The principal future market drivers are:

- IMARC estimates global silica sand market could grow from US$8B in 2019 to US$20B by 2024; Asia-Pacific the fastest growing region with potential to reach US$8B by 2026
- Supply is diminishing as a lot of the sand used in Asia comes from rivers where environmental concerns are increasingly restricting extraction
- No direct substitutes exist for the majority of applications
- The Solar panel PV market is forecast to reach US$48.2 billion by 2025, with a CAGR of 34.7%
- World Bank estimates global renewable capacity will grow by over 1TW from 2018



Source: IMARC Group, Report Title: "Asia Pacific Silica Sand Market: Industry Trends, Share, Size, Growth, Opportunity and Forecast 2021-2026*, Report Date: February 2021, Observatory of Economic Complexity Date, China Customs Data



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MARKETING

The GSSP has the capability to become a significant near-term, low-cost and premium quality silica producer, targeting high purity silica sand (with low iron) required for the production of solar panels and ultra-clear glass products.

Australia is an established silica sand exporter exporting around 5mtpa of high grade silica sand, which includes 2.5-3.0Mtpa from Cape Flattery Silica Mines , an operation located some 40kms north with a common exploration lease boundary shared with Diatreme, (Mitsubishi owned and approx. 50% of total market) and 1.0-1.5Mpta from Western Australia (predominantly other Japanese trading house owned operations) . The balance is sourced from various small mines throughout Australia.

China now imports approximately 50% or required product from Australia, up from circa 25% in 2018. Japan imports around 70% of product from Australia and South Korea imports total 68%. The demand for high quality glass (including PV solar cell covers) is driving increased demand at a time when traditional supply resources are waning.

Relative Size of End Markets:

- The Asian glass industry is the largest and shows the highest growth for high grade silica sand
- China is the largest market, with other important markets including Japan, South Korea and Taiwan
- The PV solar panel glass cover industry is experiencing exponential growth

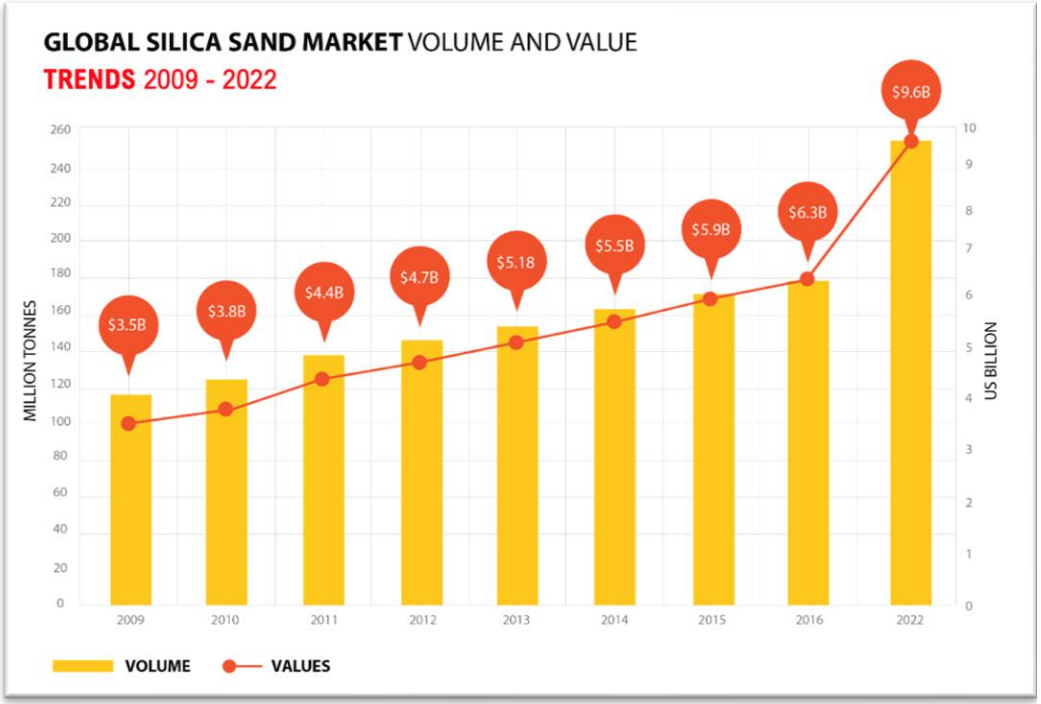
The Galalar project is capable of producing the low iron, premium quality product required for high-end, solar PV manufacturing and other specialty high end glass markets.

DRX Product Specification		China PV Specification
SiO_2 (%)	99.9	99.50
Fe_2O_3 (ppm)	110	120
Al_2O_3 (ppm)	450	1000
TiO_2 (ppm)	200	400

Typical Glass Product Specifications

Glass Application Type	SiO_2	Fe_2O_3
	%	ppm
Float (Plate)	99.5	200-400
Container	99.5	300-500
Cover (solar Panels)	99.95	<100
Smart (Ultra Clear Low Iron)	99.97	<100
Specialist (Thin Screen)	99.97	<100

**Source: Stratum Resources*



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MARKETING

Wogen Ltd and other specialist market consultants to Diatreme have completed extensive market investigations and engagement with various potential offtake partners and suppliers in China. The indicative price range for silica product (=> 99.8% SiO_2 and =< 120 ppm Fe_2O_3) currently into China is noted as variable within a range of **RMB 500-600 CIF** per tonne delivered major port (Quindao), or approximately **US$78 – US$93 equivalent** (as at 23 September 2021).

Diatreme for the purposes of analysis has taken a conservative view on market pricing and has used for its analysis an equivalent product price achieved at a small discount to "low case" pricing of **490 RMB.** For the PFS financial model, the Company has assumed an equivalent FOB onshore price of AUD$81 (USD$58 equivalent) net of costs to transport (shipping) to market.

Market Assessment – China "low iron" PV Grade Silica Product Indicative Price Range

	High case					Mid case					Low case				
	RMB	E/R	USD	E/R	AUD	RMB	E/R	USD	E/R	AUD	RMB	E/R	USD	E/R	AUD
CIF (China port)	600	6.45	93	0.72	129	550	6.45	85	0.72	118	500	6.45	78	0.72	108
Less Ocean Freight/Shipping/Insurances	-110	6.45	-17	0.72	-24	-110	6.45	-17	0.72	-24	-110	6.45	-17	0.72	-24
FOB equivalent proceeds	490	6.45	76	0.72	106	440	6.45	68	0.72	95	390	6.45	61	0.72	84

Notes: Shipping costs assume use of Supramax (55kt cargo) vessel CIF – definition – "Cost Insurance and freight"

Diatreme notes:

- *Shipping costs are abnormally high in the current market but has used five-year forward projections from independent shipping consultants based on "normalised" forward projections*
- *Whilst there is an enormous appetite in China markets for Diatreme's PV grade product, the Company intends to de-risk and re-balance geographic offtake risk where possible through access to other Asian markets. Diatreme also actively examining the potential for onshore processing of the silica product for use in solar panel manufacturing with various interested parties and Government agencies*
- *These opportunities and geographic de-risking will be explored further through the DFS process and closer to actual mining activity.*

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PROJECT METRICS & FINANCIAL EVALUATION

The PFS technical and financial results deliver the justification for the advance into Definitive Feasibility Studies (DFS) to enable confirmation of GSSP economics via Tendering. Justification for FID is expected to be delivered in Q1-Q2, 2022. Alternate commercial scenarios were considered for the development of GSSP, assessing delayed Capex and production variations with freight haulage or conveying. This is driven by refinement of the design criteria post scoping study and considers:

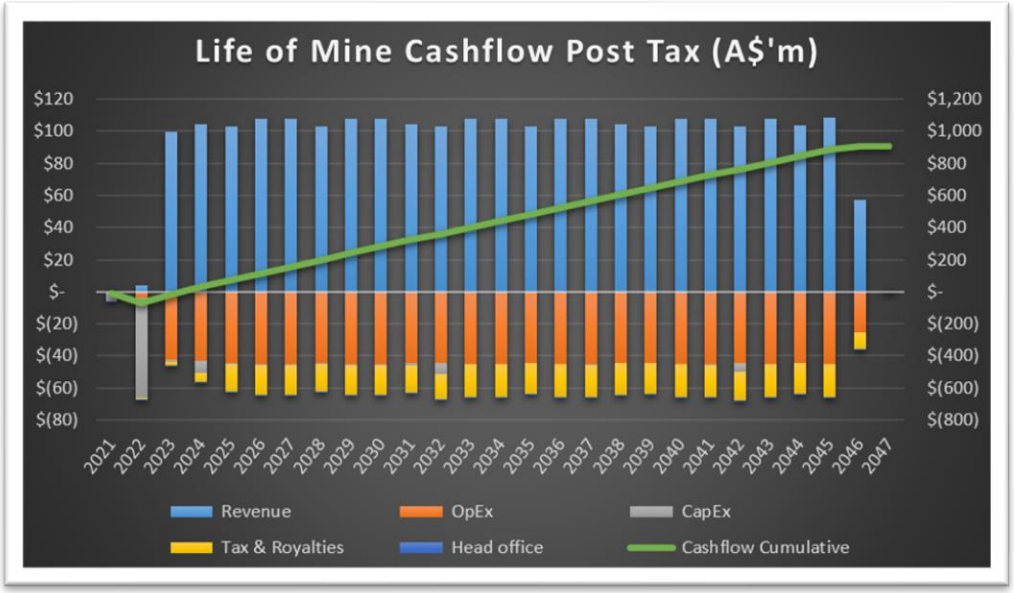
- Introduction of a conveying system option at some stage in early mine life to facilitate increased production
- Operational preparedness and training of the site personnel and the potential impacts on ramp up to production
- Recognition of environmental impacts on temporary dwellings located in proximity to the alignment of the NPR haulage
- Ramp up to shipping and the impacts of demurrage though loading efficiencies to OGVs

Processing plant engineering has allowed for components in the initial build such as larger thickener to avoid retrofitting secondary systems where possible.

The product market and price forecasts used in the PFS are based on a photovoltaic grade silica sand with an Iron (Fe) concentration ranging from 100-120ppm (meeting required PV grade silica standard) . Forward looking estimates are based on the bulk of the product being delivered to China on CIFFO terms and quoted in RMB/t. FOB terms are calculated using an assumed shipping and insurance costs.

Shipping and insurance cost inputs are in US Dollars and based on a 5 year forward looking estimate provided by Hall Shipping & Consulting. Global shipping rates are currently subject to COVID related issues and disarray on world-wide scheduling resulting in a 25-30% price premium. Prices are unsustainable and forecast to stabilise in the next twelve months.

Payment terms for the silica sands product shipping and insurance cost inputs are in US Dollars and based on a 5 year forward looking estimate provided by Hall Shipping & Consulting. Global shipping rates are currently subject to COVID related issues and disarray on world-wide scheduling resulting in a 25-30% price premium. Prices are unsustainable and forecast to stabilise in the next twelve months.



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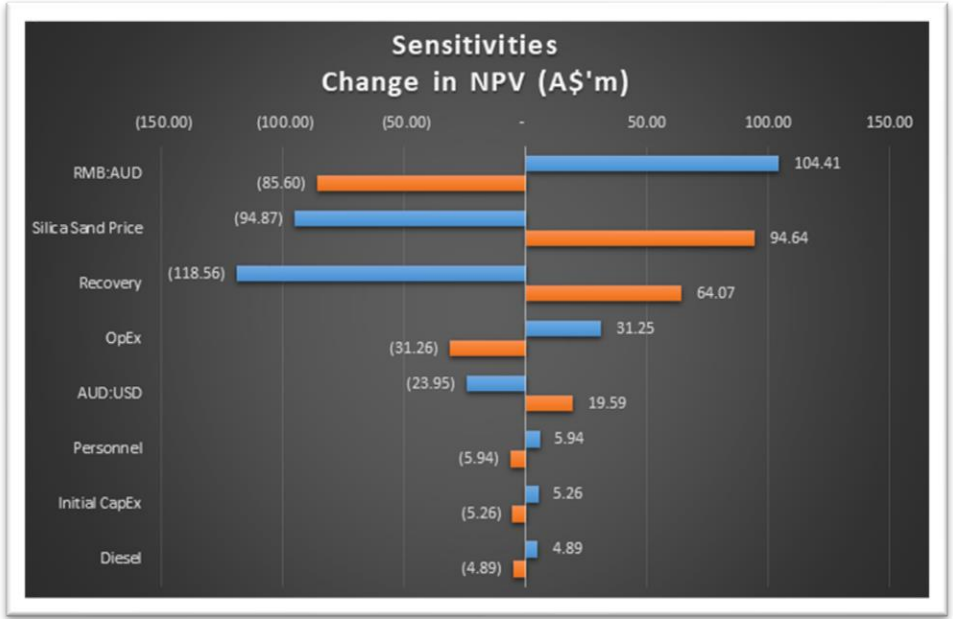
SENSITIVITIES

Sensitivity Analysis demonstrates that the GSSP is financially robust and can maintain a positive NPV through stress testing of the various scenarios. Opex will be further refined in the DFS, through assessment of the following:

- Indigenous employment agency business plan, delivering a skills base in proximity to GSSP
- Solar, thermal solar, wind power options (for possible introduction during early operations towards reducing power generation and fuel costs, aligned to carbon offset requirements
- Economic optimisation assessment on heavy fleet and generator ownership at Year 5, eliminating lease costs
- Shipping freight optimisation

The $A:$US exchange rate does not influence the project as much as the RMB:$A exchange rate as it only applies to the shipping and insurance rates. The project is least sensitive to additional Capex an fuel price variation,.



Fiscal	Assumption
Australian Corporate Tax	30%
GST	The financial model assumes the Project is GST neutral on a period by period basis No GST has been assumed for initial working capital build
Queensland State Royalty	A$0.90/wmt Silica Sand sold (Mineral Resource Regulation 2013)
Traditional Owner Royalty	1.0% of Project Revenue (FOB basis) [need agreement definition]
Tax Losses	Included
Depreciation	Asset Life 10 years Straight line depreciation
Employment taxes and superannuation	These are incorporated into the relevant labour rates
Fuel excise	All fuel (land and marine) purchased is assumed to be exempt from Australian Fuel Excise
Leased Equipment	Finance Leases have been assumed where applicable
AUD:USD	0.72
RMB:AUD	4.645

**Company notes cross currency risks in multiple currencies, A$, RMB and US$ which will need to be managed and where appropriate mitigated via various financial risk management products.*

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NATIVE TITLE, CULTURAL HERITAGE AND STAKEHOLDERS

Diatreme and the Native Title Clan members have signed a Memorandum of Cooperation towards entering into the MPA. This will define a joint commitment to apply the principles of Free, Prior and Informed Consent to all aspects of decision making by Hope Vale Congress and the Native Title Holders.

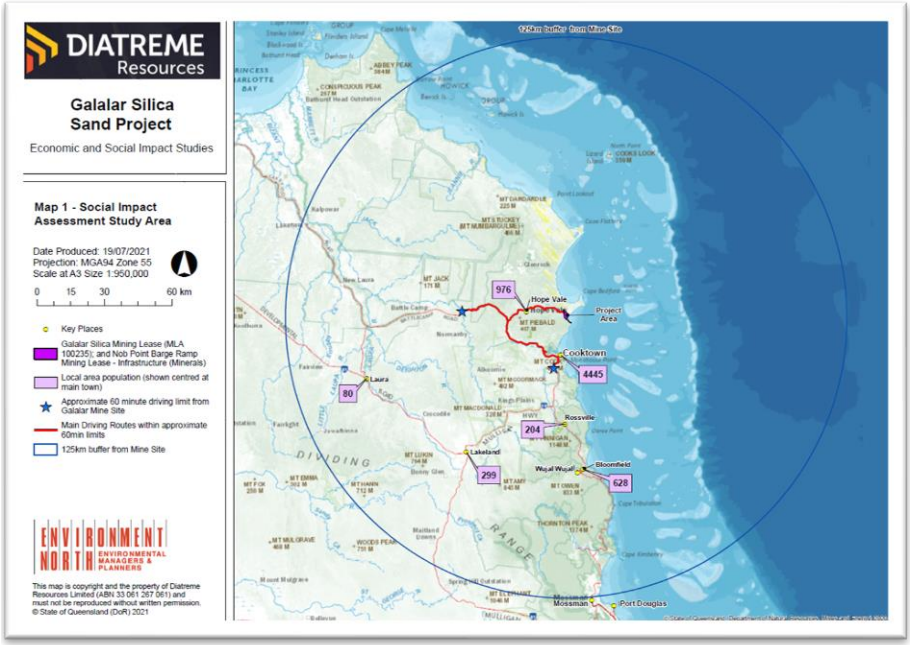
Hope Vale Congress represents the interests of 13 Native Title clans. Its foremost priority is to: … *"maintain the rights of the Traditional Owners as the custodians of their own country and to improve access and work collaboratively with Traditional Owners so they can get back on country to build their capacity in land management, business development and achieve their clans' aspirations."*

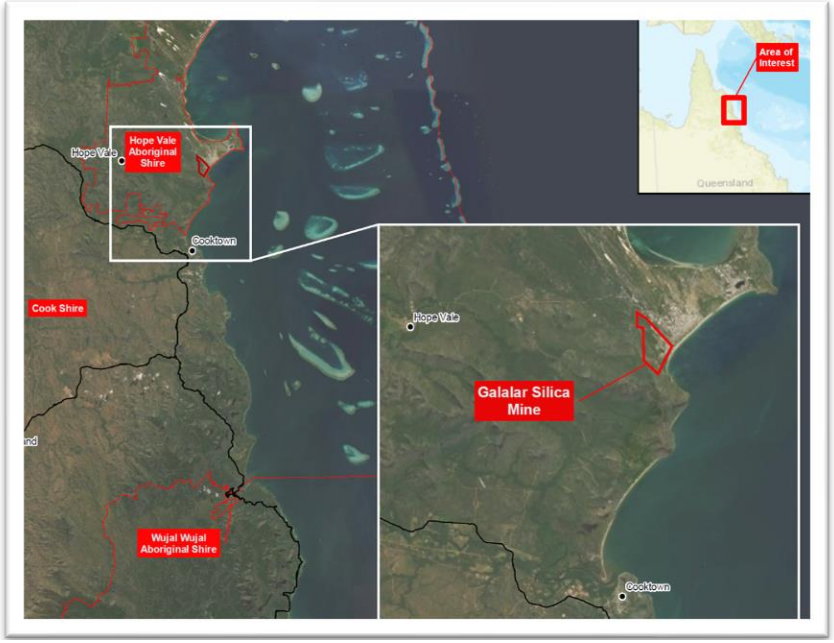
The Thiithaarr and Gamaay people have established negotiation committee, with aim of delivering substantial benefits, business programs and direct community involvement. The benefits include a 12.5% equity and a royalty benefit sourced from the operation of the GSSP.

A liaison committee will be established to interact with Diatreme site personnel and Hope Vale Congress. Galalar Silica Pty Ltd (GSPL) will manage the GSSP under a Services Agreement for the provision of specialist services.

Diatreme is also working with other Stakeholders including the Hope Vale Aboriginal Council and relevant State and Commonwealth government agencies. Ongoing community consultation and information meetings are planned from Q4 2021-Q3 2022.

The release of the EIS and advance to public notice on the Mining Lease will trigger a number of interactions with Stakeholders.





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COMMUNITY DEVELOPMENT

The Strong and Sustainable Resource Communities Act 2017 (CG, 2018b) specifies that a 'nearby regional community' is one within 125 km of a large resource project and that has more than 200 people (or a greater or lesser distance or smaller population decided by the Coordinator-General). Diatreme is committed to managing potential impacts to community social values and implementing reasonable measures to support opportunities to enhance community social values.

To ensure the effectiveness of the management initiatives, further development of plans will require and benefit from the participation and input of key Stakeholders including the Native Title parties, Hope Vale Congress, Hope Vale Aboriginal Shire Council, Cook Shire Council (CSC), relevant State Government service providers (including the Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships (DSDSATSIP), the Department of Communities, Housing and Digital Economy (DCHDE), and the Department of Health).

The Social Impact Management Plan (SIMP) including detailed action plans will need to be finalised and approved in Q1 2022, which allows for 12 month development period prior to operations. Diatreme under the terms of the MPA engages with the appointed Indigenous Liaison Committee and Liaison Officers. Hope Vale Congress and Hope Vale Aboriginal Shire Council are also consulted on stakeholder matters, inclusive of developing the SIMP. Headline programs:

- Native Title Holder Training and Employment Plan (TEP)
- Support for CYI/Pama Futures for home ownership planning
- School student awareness tours
- Community open days at GSSP
- Support measures in the Native Title Group Business Development Plan (NTGBDP), including the delivery of services in environmental management, monitoring, and rehabilitation
- Establishment and support to Indigenous Employment Agency (IEA)
- Support NTG businesses to network with Indigenous business organisations and Cooktown Chamber of Commerce
- Support through engagement of local Cooktown businesses.

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ENVIRONMENTAL IMPACTS

Impacts to the terrestrial and marine environment including surface and ground water have been assessed in detail during the EIS. The data is being utilised to develop site environmental procedures well in advance of operations. There are no aspects of the GSSP resulting in a significant residual impact to the Outstanding Universal Values of the Great Barrier Reef World Heritage Area.

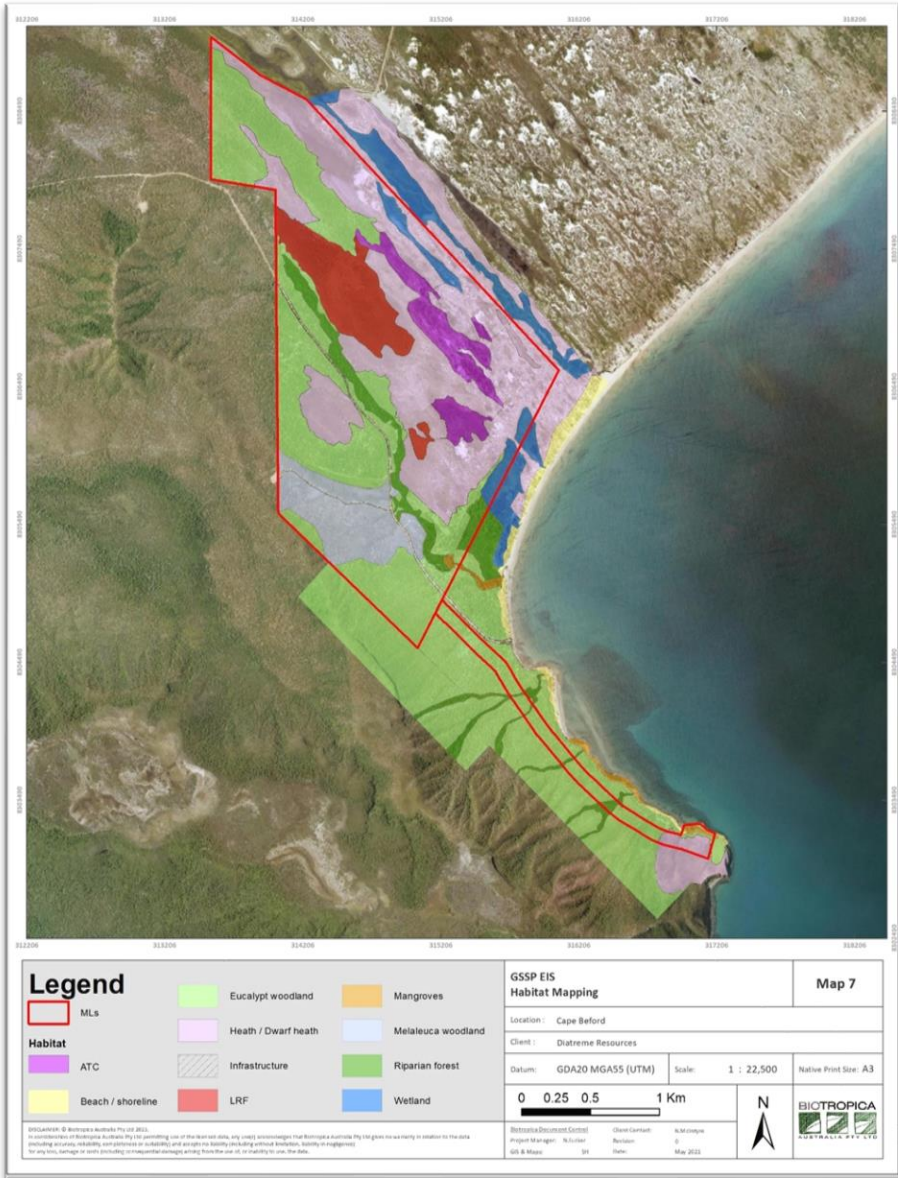
As part of a large coastal dune system, the Project Area supports a range of coastal vegetation and habitat communities. There are eight broad vegetation communities/habitats present within the area. These habitats support a range of flora and fauna species commonly associated with littoral rainforest and dune environments. Key species known or likely to occur include a range of bats, shorebirds and waders, and coastal mammals and reptiles. The surface waterways and wetlands support saltwater crocodile and a range of aquatic fish species. These species include a variety of species listed as threatened and/or migratory under State and Commonwealth legislation.

Groundwater dependent ecosystems (GDEs) within the Project area include surface expression and subterranean GDEs. This includes coastal drainage swamps dominated by heath communities in along the southeast and northeast parts of the Project area, as well as potential subterranean aquifers.

Water supply (850 Ml/yr) will be pumped from the GSSP upper dune system. Extensive regional and local groundwater modelling has been completed demonstrating the negligible impacts of the mine. The Department of Regional Development, Manufacturing and Water (DRDMW) has bene consulted on securing water through the Cape York Water Plan CYPHA reserve. The approach is in partnership with Hope Vale Congress who are eligible to hold substantial volumes of water from the Endeavour Basin.

Due to its sheltered nature and high water quality, the Nob Point embayment includes seagrass meadows. There is also a previously unmapped inshore reef habitat heavily colonised by macroalgae with occasional living coral heads. The remainder of the marine study area is comprised primarily of unvegetated soft sediment benthic habitat.

Terrestrial Habitat Mapping



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ENVIRONMENTAL MANAGEMENT

A series of environmental management and monitoring actions have been identified in the EIS. These have been grouped at present into three overarching environmental management plans (EMPs), noting that more detailed plans would be developed and implemented for the project. The management plans set out the commitment by Diatreme towards impact management, including outcomes and performance criteria, and the actions to be undertaken to achieving these outcomes. The management plans form an initial framework for EIS assessment purposes and will be supported by more detailed management plans to be developed once all detailed regulatory approvals, authorities and permits are secured.

Mined areas are to be rehabilitated progressively after mining panel advance to meet a range of environmental, scenic, cultural, social, and engineering KPI's.

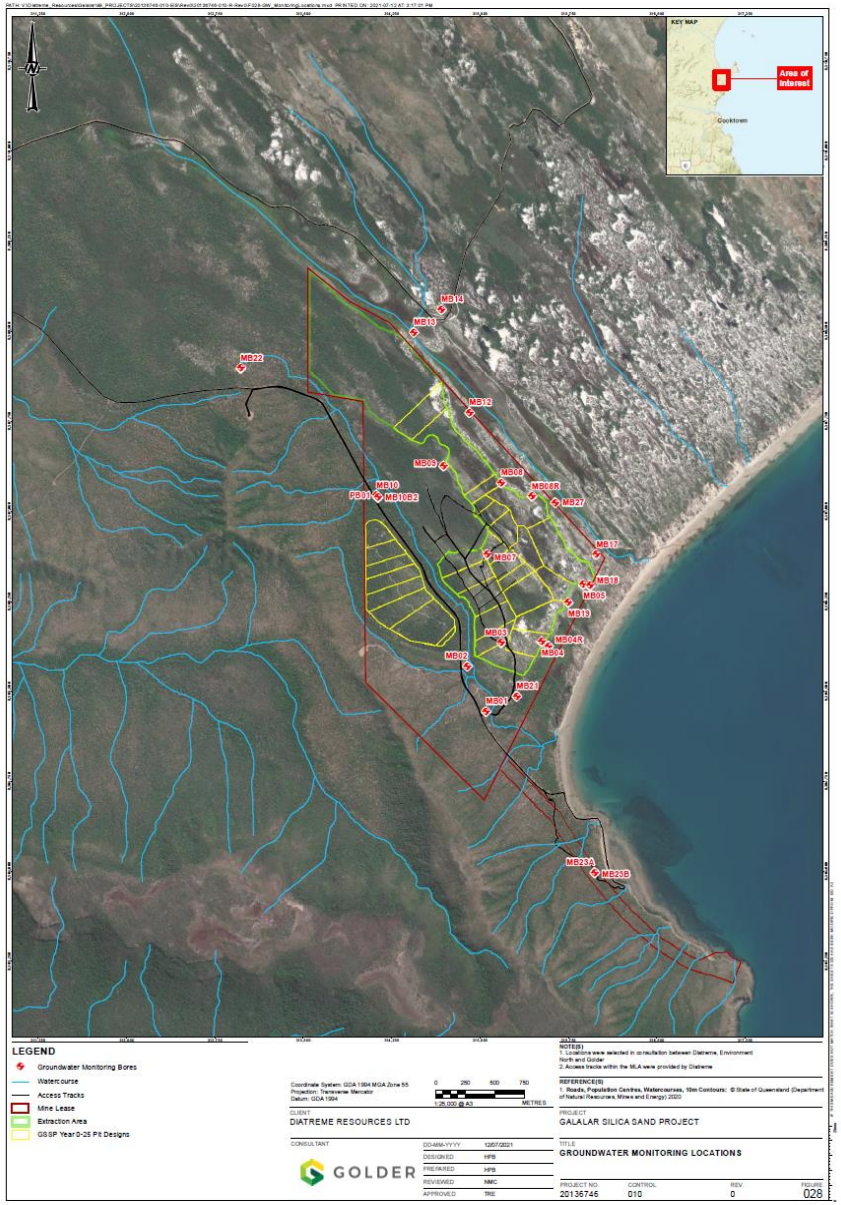
Mining and infrastructure clearing result in a net change in landscape, as is inherent within sand mining works. While this will not affect drainage patterns, potential impacts and management are considered for surface GDEs, such as palustrine wetlands adjacent to the mine site. These impacts will be managed to support the similar environmental and habitat values that exist pre-mining. Importantly, as the ground and surface waters of the site are effectively disconnected from other systems in the broader region, regional impacts are not expected.

Groundwater, surface water, sediment and dust monitoring are well advanced at GSSP, establishing baseline data. Conditioning for ongoing monitoring and compliance will be established in the Environmental Authority (EA) post approval to the EIS.

The Post Closure Rehabilitation Plan (PCRP) has been drafted and will be assessed during the EIS process, then finalised prior to EA.

Offsets for approximately 2.4Ha of Littoral Rainforest will be required. All other areas of Littoral rainforest will be avoided until Diatreme is able to prove rehabilitation is possible. Trial nurseries with community management are planned in early 2022.

Water Bore Locations



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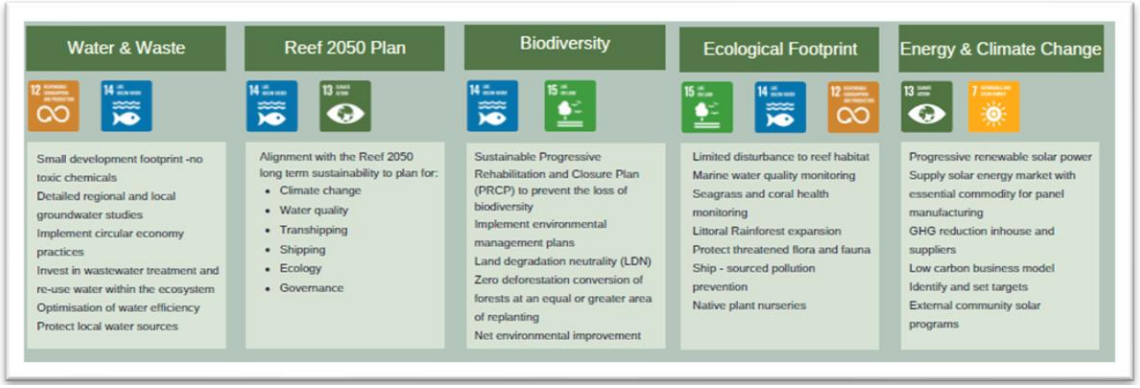
SUSTAINABILITY – ENVIRONMENT, SOCIAL, GOVERNANCE

The 2030 Agenda for Sustainable Development includes 17 Sustainable Development Goals (SDGs). DRX has benchmarked the GSSP against two internationally recognised standards for sustainability for the mining industry. These are the Initiative for Responsible Mining Assurance (IMRA) Standard for Responsible Mining (2018) and the Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability (IS) Rating Tool.

Climate Change and Greenhouse Gas estimates are a component of the EIS study. The GSSP will contribute to the production of over 71,000 solar panels, based on a standard 18 to 20 kg of glass in each solar panel. These panels are likely to be primarily used in residential and commercial energy generation and therefore directly replace the need for energy over the life of the panel, once embedded energy used in manufacture is recovered. This has the benefit of both reducing net emissions from these sources and reducing the demand for dependence on coal for power generation. Accounting for this substitution creates a net positive outcome for the GSSP, amounting to a net reduction in emissions of 25.5Kt CO2-e comparative to a scenario without the project.



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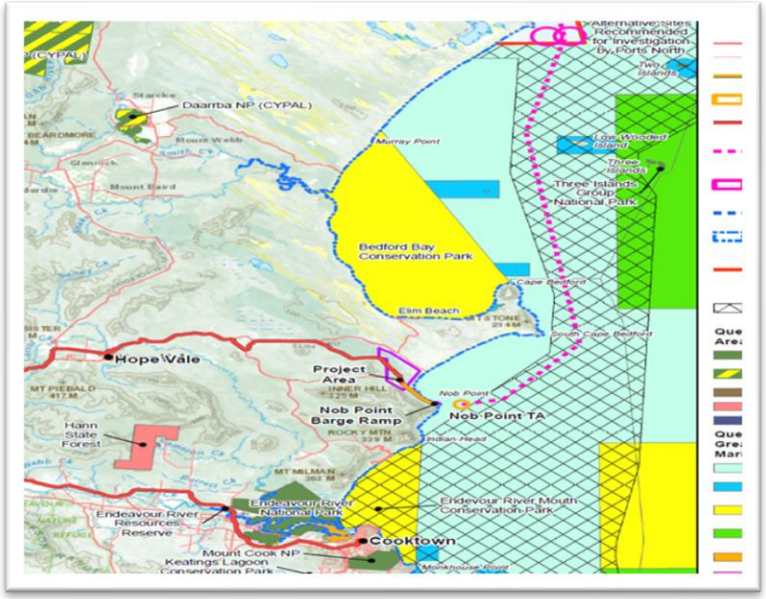
GALALAR ENVIRONMENTAL NET IMPROVEMENTS (GENI)

The principles underpinning the GENI plan align to Diatreme ESG Principles:

- Assess organisations and sustainability programs with a local focus on delivering specific collaborative programs at GSSP, Cape Bedford and Hope Vale
- Assist progression of initiatives which may be already underway though possibly stalled (Ranger programs)
- Prioritise programs and initiatives which include the participation of the local Indigenous community and promote employment, training and capacity building opportunities
- Move from an environmental compensation logic to a progressive Net Improvement approach; measured by specific Key Performance Indicators (KPIs) and with definitive planning and governance arrangements for implementation.



Supporting the Transition to Low Carbon Economy

- Installation of solar/solar-wind hybrid systems to limit reliance on diesel power generation at GSSP and potentially in Hope Vale
- Acquisition of additional carbon credits or instigation of rainforest rehabilitation programs around Hope Vale

Littoral Rain Forest and Terrestrial Habitat Revegetation

- Reinstating or expanding Littoral Rainforest habitat at GSSP and surrounding areas
- Investing in nursery development and trial propagation, including growth media development, with programs on locally owned farming properties

Building Resilience of the Great Barrier Reef World Heritage Area

- Support to Indigenous Traditional Use of Marine Resources Agreements (TUMRA) programs
- Annual drone and boat surveys of the corals and seagrass resources present in the adjacent embayment to Nob Point and north to Cape Bedford
- Mangrove and near shore marine management- rehabilitation- propagation programs
- Regular marine debris (plastics, solid waste) foreshore recovery programs
- Engagement with consults implementing the Eastern Cape York WQIP and the GBR Foundation is proposed. Facilitating existing programs that can contribute to meeting water quality targets.

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PERMITTING AND LEGAL

The development and operation of GSSP is subject to a range of State (26) and Commonwealth Government (9) principal legislation, plans, policies, protocols, conventions (13), agreements, standards and codes.

In addition to the EIS, specific approvals that are likely to be required for the GSSP to be constructed and operate classify as:

- Project-wide authorisations
- Approvals required for mine site establishment and operations associated with the Project
- Marine Approvals that are likely required for the export operations associated with the Project. This includes the terrestrial and marine components of the NPBR and the associated loading, barging, and shipping operations. Please note that a reference to an Act includes reference to subordinate legislation under that Act to the extent relevant.

Many of the environmental treaties and obligations are given effect through the Environment Protection and Biodiversity Conservation Act 1999 (Cwth) (EPBC Act, see below) or otherwise through State legislation (e.g. MARPOL Convention requirements under the Transport Operations (Marine Pollution) Act 1995 (Qld).

Matters of National Environmental Significance (MNES) are addressed through the EIS process.

PROJECT WIDE AUTHORISATIONS

Activity	Legislation	Approval	Approving Authority
Controlled Action Approval	EPBC Act 1999	Approval to undertake the action relevant to the MNES.	DAWE
Native Title Agreement / Mining Project Agreement	Native Title Act 1993	Diatreme is undertaking a Right to Negotiate (RTN) Process with Hope Vale Congress which will result in a section 31 agreement to be prepared under the Native Title Act.	Approval by the Parties (Diatreme and Congress)
Cultural Heritage Management Plan	QLD Aboriginal Cultural Heritage Management Act 2003	Cultural heritage issues and matters will be addressed as part of the s.31 agreement under the NTA.	N/A
Social Impact Assessment (SIA) and Social Impact Management Plan (SIMP)	Strong and Sustainable Resource Communities Act 2017	An SIA needs to be prepared as part of the EIS.	Queensland Government Office of the Coordinator General

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MINE AND OPERATIONS

Activity	Legislation	Approval	Approving Authority
Environmental Authority (Resource Activity)	*Environmental Protection Act 1994*	The Environmental Authority (Resource Activity) will be informed by the assessment and recommendations of DES regarding the EIS Assessment Report.	DES
Mining Lease and Mine Infrastructure Lease	*Mineral Resources Act 1989*	The Mining Lease (ML) and Infrastructure Mining Lease will cover the mining operation as well as the Nob Point Access Road and NPBR.	DoR
Water licence - groundwater extraction and use	*Water Act 2000*	Approval under the Act (in the form of a water licence) is required to extract and use surface and groundwater for the mining project. This will be obtained through existing allocations to the Hope Vale Congress.	DoR
Works or operations that affect a protected plant or animal	*Nature Conservation Act 1992*	An approval and/or authorisation can be required as follows – (a) to disturb or clear habitat for a protected plant species; (b) a Species Management Program (SMP) for protected fauna and their habitat and (c) a damage mitigation permit to take, remove or relocate wildlife.	DES
Riverine protection permit	*Water Act 2000*	A riverine protection permit under the Act may be required to destroy vegetation, excavate or place fill within a watercourse, lake or spring. This will be determined as part of the detailed design process for the mining activity.	DoR

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MARINE EXPORT OPERATIONS

Activity	Legislation	Approval	Approving Authority
Entry and use of the marine park and works in the marine park	*Great Barrier Reef Marine Park Act 1975 and Marine Parks Act 2004*	Joint (Cth - State) marine park permit for: • Entry and use of a general use zone of the marine park • Construction of the barge ramp in the GBRCMP (e.g. the State Marine Park) between Highest Astronomical Tide (HAT) and Low Water Mark (LWM) • Construction of the barge ramp and mooring piles in the GBRMP (e.g. the Federal Marine Park) below LWM.	GBRMPA DES / QPWS
Seabed Lease (lease applying to areas below low water mark)	*Land Act 1994*	A lease is required to authorise the barge ramp and the mooring piles which are partly or wholly outside of the mining leases issued under the MR Act. As there is no native title determination with respect to the land or waters below high water mark at Nob Point, the application for the lease (as well as other approvals in this table) will be subject to notification of relevant native title parties under s.24HA of the *Native Title Act 1993.*	DoR
Prescribed Tidal works	*Planning Act 2016* and *Coastal Protection and Management Act 1995*	Development Permit for Operational Works (that are prescribed tidal works) for the barge ramp and associated mooring piles at Nob Point outside the Infrastructure ML.	Cook Shire Council (Assessment Manager) SARA / DES / MSQ
Destruction of marine plants	*Planning Act 2016* and *Fisheries Act 1994*	Development Permit for Operational Works (that is the removal, destruction or damage of a marine plant) – for seagrass in the footprint of the barge ramp and associated mooring piles outside the Infrastructure ML.	SARA / DAF
General fisheries permit	*Fisheries Act 1994*	Applies to the removal of any corals or other encrusting macroinvertebrates (designated as fish species under the *Fisheries Act 1994*) that will be displaced, removed or transplanted by the proposed barge and boat ramp facility outside the Infrastructure ML.	DAF
Prescribed ERA 50 (bulk minerals handling/ transhipping)	*Environmental Protection Act 1994*	ERA 50 will apply to: • the transhipping activity (ship to ship transfer of minerals); and • the transfer of the silica material from the land to the barges at the Nob Point barge ramp (in bulk)	DES

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GEOLOGY AND EXPLORATION

The Cape Bedford-Cape Flattery region is dominated by an extensive Quaternary sand mass and dune field which extends 60km from north to south and stretches inland from the present coast for approximately 10km. The major sand masses have developed through many cycles of sea level change. Abundant sand was supplied by strong prevailing onshore winds blowing large volumes inland to form higher dunes.

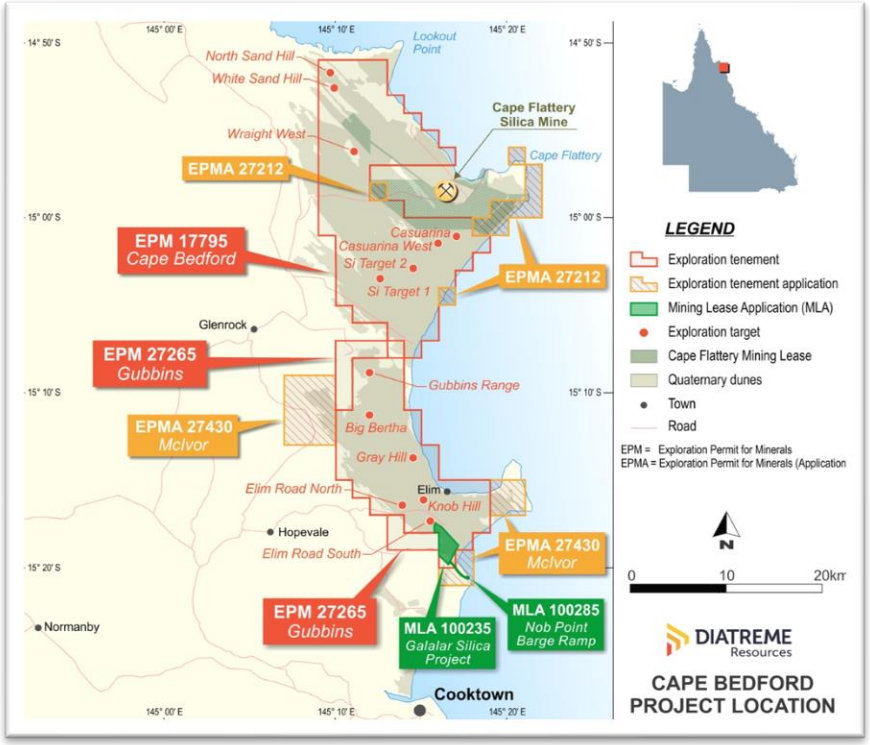
The dune field lies to the east of an upland area consisting mainly of Mesozoic sedimentary rocks and outcrops of lower Palaeozoic metamorphics and volcanics. These outcrops include the rocky headlands of Cape Bedford, Cape Flattery and Lookout Point. The dune field sand is eroded from numerous sources, with the weathering of Mesozoic sandstone, outcropping regionally to the west of the area being considered the dominant source.

Sand dune accumulations are subject to the development of distinctive horizons due principally to leaching as the dunes experienced seasonal rainfall. This seasonal rainfall and temporary stabilisation of dunes allowed vegetation to establish and resulted in the generation of acid from decomposing vegetation.

The resulting low pH groundwater and the porous nature of the sand provided means for the undifferentiated sand to be continually leached of iron and aluminium rich minerals resulting in a higher percentage silica and "whitening" of the colour of the sand. As the sand was leached of aluminosilicates (clays and feldspars), heavy minerals and iron oxides, the minerals that weakly cemented the sand and coloured the sand were removed resulting in high purity silica sand within the dunes systems, which continued to rework as the dunes became more widespread and stacked up to 100m high.

Diatreme is actively expanding drilling on the Galalar system to the northwest of the GSSP ML and also completing low impact exploration concentrated on the more accessible areas of Si Targets 1 & 2, which forms part of the largest silica dune system between Cape Flattery and the McIvor River.

Resource Drilling – Low Impact Tractor



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MINERAL RESOURCES

Ausrocks Pty Ltd (Ausrocks) has completed a mineral resource estimation based on information and data for the GSSP provided by Diatreme. Ausrocks has confirmed Diatreme's geological knowledge and confidence in the GSSP. Metallurgical testing results during the PFS have provided valuable confirmation to the resource validity.

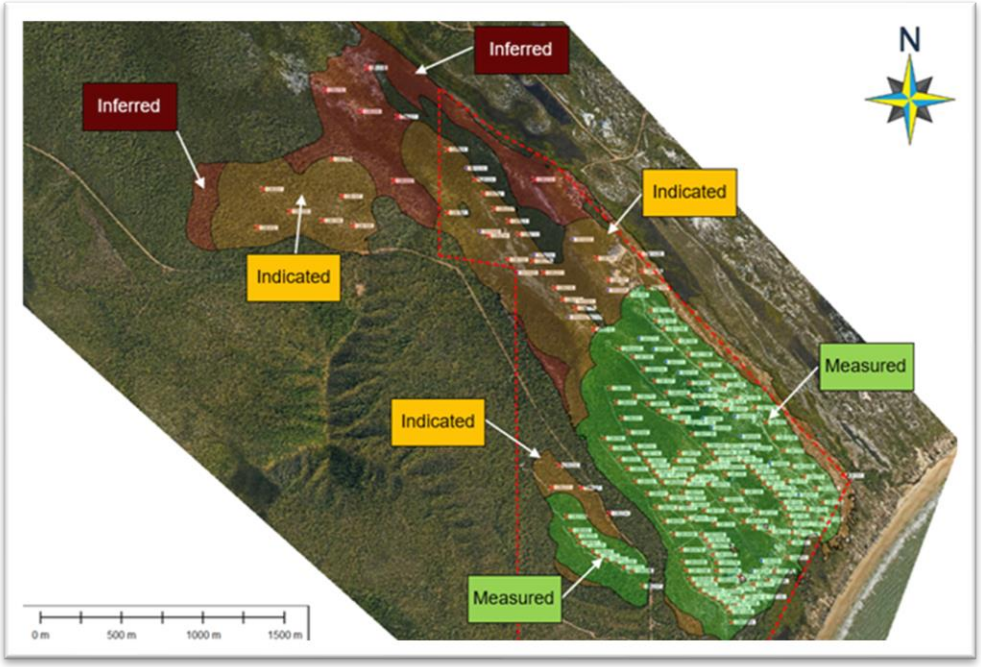
Drill spacing and interpreted geological continuity has allowed three resource categories to be defined which have been estimated in accordance with the JORC Code (2012) and are defined as follows:

- **Measured Mineral Resource**: Area with drillholes at semi-gridded spacing (<150m x 150m) ending in basement/water table.
- **Indicated Mineral Resource**: Area with drillholes at confirmatory level spacing (150m-250m) ending in basement/water table.
- **Inferred Mineral Resource**: Areas with drillholes at a scout level spacing (250m-400m). Includes geological interpretation when drillhole open at depth.

Assays from 2427 samples collected in 137 air core holes and 23 Auger holes for a number of drilling campaigns have been assessed a sand model developed in Micromine 2021. Extensive specific gravity testing and review of contaminant mineral distribution has produced detailed dune models.

Assessment of variography indicates high continuity on silica grade.

Mineral Resources Distribution GSSP



JORC Resource Category (in situ)	Silica Sand (t)	Silica Sand (m^3)	Cut-off Grade SiO_2 (%)	SiO_2 (%)	Fe_2O_3 (%)	TiO_2 (%)	LOI (%)	Al_2O_3 (%)	Density (t/m^3)
Measured	43.12	26.95	98.5	99.21	0.09	0.11	0.16	0.13	1.6
Indicated	23.12	14.45	98.5	99.16	0.09	0.13	0.24	0.10	1.6
Inferred	9.22	5.76	98.5	99.10	0.11	0.16	0.27	0.11	1.6
Total (Measured + Indicated + Inferred)	75.46	47.16	98.5	99.18	0.09	0.12	0.20	0.12	1.6

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METALLURGY

Diatreme engaged Mineral Technologies (MT) to complete a Feasibility Study for GSSP, with the objective of developing a mineral process flowsheet enabling engineering plant design to produce high purity silica sand suitable for photovoltaic glass manufacturing. A primary bulk sample was composited from drill samples that had been completed at that time in the area forecast for the first five years of the ore reserve.

Previous process testwork by IHC Robbins and Bengbu Design & Research Institute demonstrated that a silica sand product that achieved the specifications for photovoltaic glass manufacture could be produced from selected samples across the mineral resource.

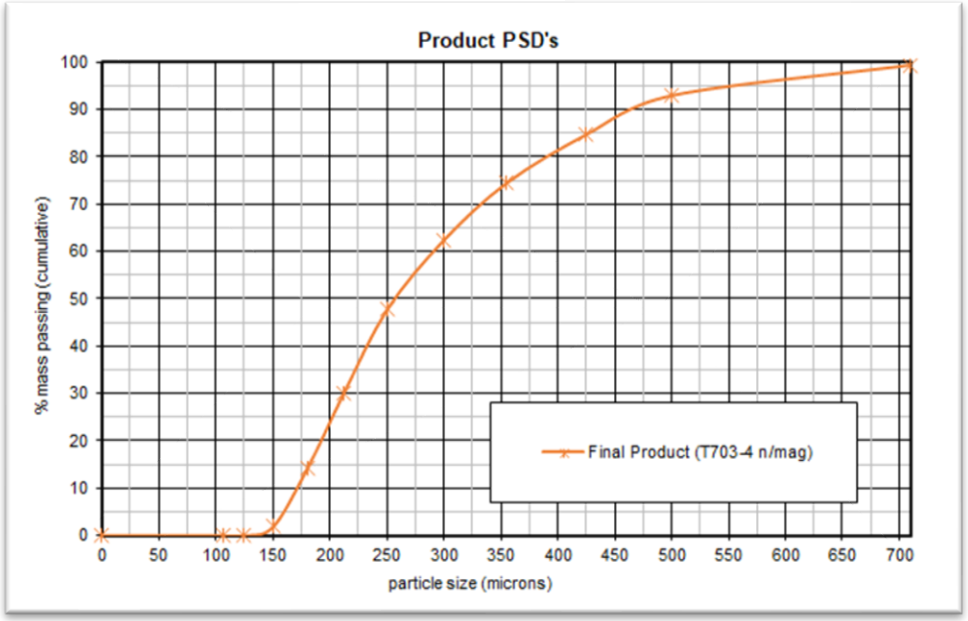
The 870kg bulk sample was prepared by compositing samples as advised by Diatreme from drilling that had been completed in the initial 5 year mining area. Process characterisation of two variability samples ("LG" and "HG") in parallel with the primary bulk sample showed the Fe_2O_3 content of the silica contained in each sample was similar. All three samples produced a silica sand product in the range 100ppm to 110ppm Fe_2O_3. The main difference between the samples was the higher proportion of fines (-106µm) contained in the LG (8.8%) and HG (5.6%) compared with the testwork sample (4.2%).

Metallurgical testing on bulk sample containing 99.6% SiO_2 and 300 ppm Fe_2O_3, produced a silica product containing 99.9% SiO_2 and 105 ppm Fe_2O_3. Additional testing on the spiral middling stream resulted in potential for up to 8% additional yield (total 80%), with a grade of 99.9% SiO_2 and <110 ppm Fe_2O_3. Sizing range for the product is 125-700microns.

Hot acid leach (HAL) tests conducted on silica product indicated it was possible to further reduce the Fe_2O_3 level to ~70ppm. The test method used was a standard Hepworth method involving leaching silica with sulphuric acid at elevated temperature.

Metallurgical studies on final product indicate clean silica grains with minor internal Fe oxide, silicate and rutile-ilmenite inclusions.

Sand Particle Sizing



ICP assay (%)	SiO_2	Al_2O_3	CaO	Fe_2O_3	K_2O	MgO	TiO_2	CR_2O_3	LOI
Bulk sample	99.6	0.069	0.002	0.030	0.007	0.003	0.061	<0.001	0.13
Silica product	99.9	0.042	0.004	0.0105	0.004	0.002	0.018	0.0001	0.04

Photomicrograph Sand Particle with Minor Iron inclusions

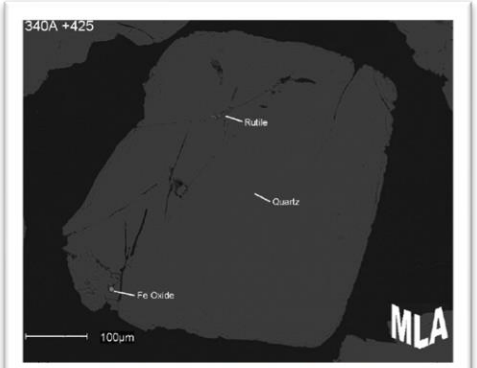


Figure 9 1340A +425 um Fe Oxide in Quartz

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PROCESSING ENGINEERING

Processing plant costs and estimates by CDE Global Australia Pty Ltd (CDE) are utilised in the PFS Capex estimates and include an EPC solution. CDE are engaged to complete detailed engineering in 2.5 months for the purpose of DFS and have produced initial Process Flow Diagrams (PFD's) for the plant, which upgrade the preliminary MT design. The processing plant includes:

- Slurry pumped ore from the Mining Area Plant (MAP) discharges onto a vibrating screen mounted above the surge bin. Screen undersize drops into the surge bin for density control
- MG12 spiral separators receive slurry pumped from the surge bin and distributed through pressure and static distributors. Sand rejects are returned to the MAP for rehabilitation. The silica product stream is laundered to the attritioner feed bin
- Slurry from the attritioner feed bin is pumped to de-watering cyclones where the cyclone underflow is distributed to attritioning cells to release contaminants from the surface of the silica grains. The cyclone overflow returns to the thickener. The attritioner discharges into the classifier feed bin where water is added to reduce the slurry density to cyclones above the up-current classifiers. Low-density overflow slurry stream return to a cyclone, reject sand reports to the tailings sump and overflow water is reused. The UCC underflow is the silica product stream and is laundered into the magnetic separator feed bin
- Wet high intensity magnetic separators receive the product stream from the classifiers and remove any remnant iron bearing particles that have sufficient magnetic susceptibility. The magnetic and middlings streams from the magnetic separators are laundered to the tailings transfer sump and the non-magnetic splits are directed to the final product transfer bin for pumping to the product stockpile area
- A thickener is included in the process to thicken slimes for deposition at the sand tailings area. The ore contains approximately 3% slimes resulting in a small thickened slimes stream that can be contained in sand bunds until sufficiently dewatered to be covered with sand. The thickener overflow will be clean water that will be reused in the process. Inclusion of a thickener reduces quantity of water extracted from bores and reduces the discharge of process water to the site
- Silica product is pumped as a slurry to the product stockpile. The product slurry is delivered to a cyclone and dewatering and then sand (12% moisture) is conveyed to an extendable radial stockpile conveyor. The water removed by the dewatering screen is returned to processing
- Process water is recirculated where possible and make up water supplied from the nearby borefield at a rate of 27l/s.

Description	750Ktpa (processing ramp up)	1.32Mtpa
Mining rate (t/h)	152	223
Plant feed rate (t/h)	150	220
Operating availability (hr/yr)	7,500	7,500
Annual silica product (Kt)	750	1,320
Product SiO_2 grade (%)	99.9	99.9
Product Fe_2O_3 grade (ppm)	<120	<120

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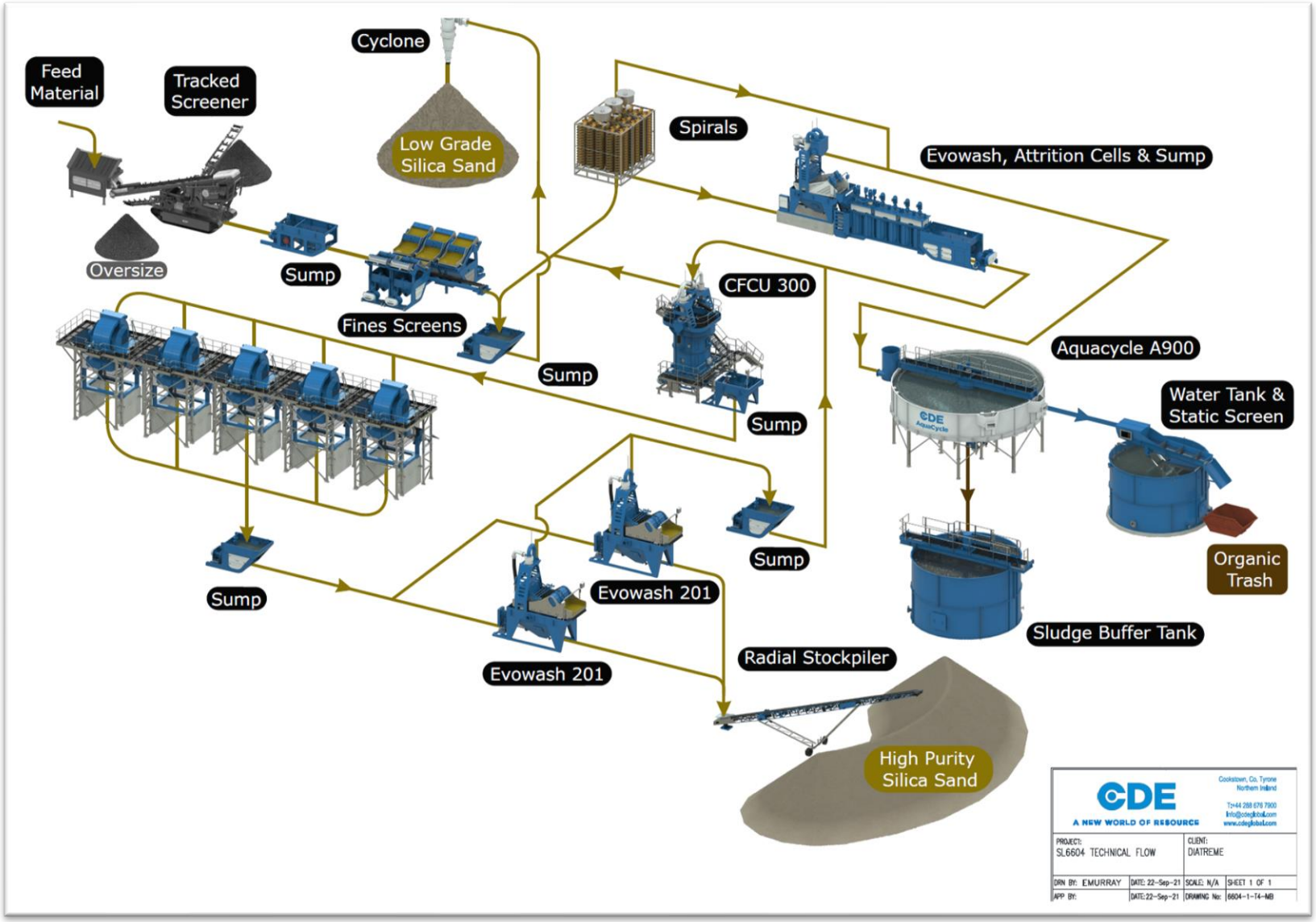
MINE-PLANT-STOCKPILE PRODUCT DELIVERY



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ORE RESERVES

The Mineral Reserve Estimate (maiden) has been completed by Ausrocks Pty Ltd, applying updated inputs on the basis of the PFS financial model. Approximately 43% of the previously defined Mineral Resources (75Mt) have been converted to Ore Reserves.

The mining schedule has been developed to prioritise <950ppm Fe_2O_3 silica sand in the first 10 years, exploiting sand containing 490ppm-930ppm Fe_2O_3, with an average of 620ppm Fe_2O_3. This provides certainty that the proposed plant will operate as designed and deliver product within specification. Year 10 onwards contains on average a higher Fe_2O_3 content, though below 1200ppm. Metallurgical testing indicates that material with >1200ppm Fe_2O_3 can be processed into high grade product at a reduced plant throughput. Rehabilitation requirements will be in line with production, with 20% of material mined returned to the pit as benign reject sand.

Advanced grade control drilling will be required prior to vegetation clearing; a surface drill rig will be deployed to the area to drill on an approximately 50x50m grid with samples assayed at 1m intervals. Grade control estimates will guide short term mine planning.

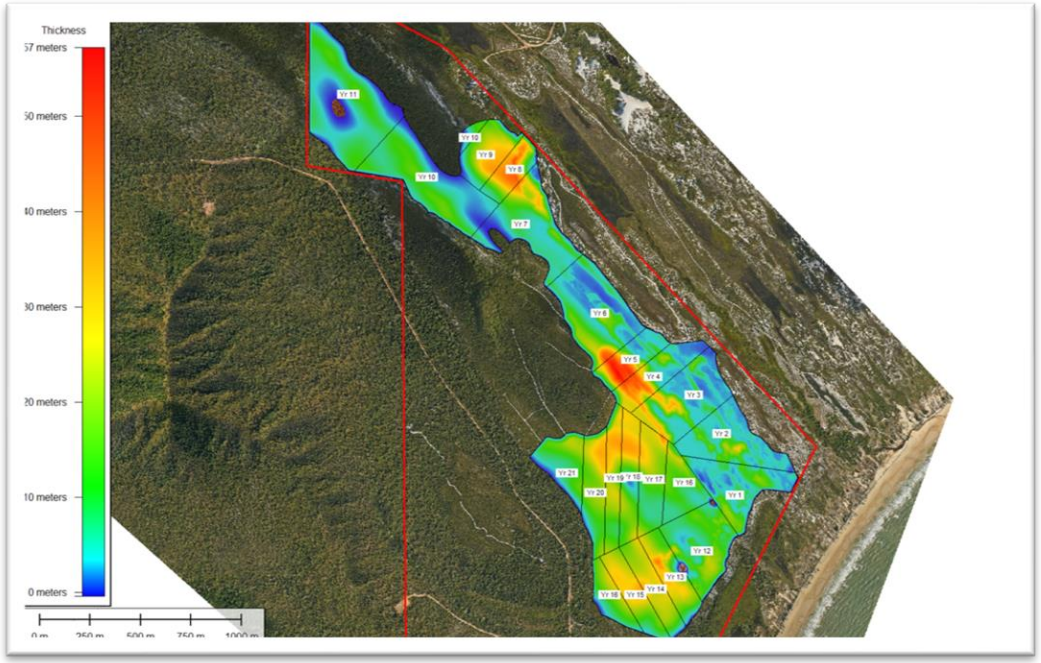
The GSSP is a bulk commodity surface deposit with no specific overburden. Pit shell optimisation has been carried out using environmental and Resource constraints as follows;

- Base of pit in the eastern side is defined by the dry season water table level, as mapped by Golders. The quality sand resource continues at depth below this level as defined by the core drillholes
- Base of pit on the western and northern side is defined by the resource floor which undulates based on resource modelling, the rate of undulation is not considered to be an impediment to efficient mining
- Base of pit at the perimeters is the batter at 30 degrees.

JORC Category	Silica Sand (Mt)	Silica Sand (Mm^3)	Waste (Mt)	SiO_2 (%)	Fe_2O_3 (%)	TiO_2 (%)	LOI (%)	Al_2O_3 (%)
Probable Ore Reserves	32.5	20.3	0.04	99.20	0.08	0.11	0.16	0.13

Cut off Grades: 98.5% SiO_2, <1200ppm Fe_2O_3

Sand Thickness and Mine Panel Layout



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MINING

Mining at GSSP will utilise a loader feeding to trommel, then slurry pumping to processing plant. A dozer will be utilised for progressive vegetation and topsoil stripping along with rehabilitation. Mining processes minimise iron contamination to the exceptionally low iron sand product. The PFS has considered a mix of leased, owner managed fleet will be the most suitable option for the GSSP. Equipment selected is considered common for sand mining operations and similar to plant operated by local earthworks contractors and quarry operators. Industry standard training will be sufficient for operators to be proficient in operating the selected mobile fleet.

The MAP is a combination of a mobile hopper-feeder unit which discharges the mined ore at a controlled rate into a mobile screening and slurrying unit fitted with a slurry pump suitable for transferring the slurry to the SPP. The MAP will be fed by a wheel loader.

The hopper-feeder unit consists of a tipping grizzly over a hopper and belt feeder which controls the rate of ore discharge onto a transfer conveyor. The ore from the transfer conveyor is wet screened in a trommel fitted with 4mm aperture polyurethane screen panels and water sprays to assist screening. A short conveyor transports the 4mm oversize material to a stockpile away from the mining unit. The screened ore particles smaller than 4mm fall into a sump below the trommel where sufficient water is added to pump the slurry to the processing plant.

The use of staged pumping as the mining area plant moves, will allow the mine face and reject sands deposition to continue at two kilometres from the plant location. Engineering and economic studies will be undertaken as the mining face moves further away to determine the optimum time for relocating the plant.

Densified tailings (low-grade silica sand) will be pumped to a land-based stacker in the rehabilitation area. Once dewatered, the material will then be spread by a dozer to final landform. Topsoil will be reclaimed from windrows and heath/dwarf heath species or wetland community vegetation species reinstated in panels behind the mining advance.

GSSP Development and Nob Point

Typical Silica Mine Face

**Source Cape Flattery Silica Mine (DRX-Casuarina Hill Prospect in Background)*

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INFRASTRUCTURE

Operational requirements post initial road upgrades (Alberts Camp Road) and development of the NPR, are limited to periodic maintenance and dust suppression. This will be delivered through mine operations personnel utilising the Diatreme fleet. Locally supplied resurfacing gravel products are available from local quarries.

Administration and Services includes the site offices, workshop, laboratory, crib room, amenities building, emergency accommodation buildings, potable water plant, fuel storage facilities, diesel/solar hybrid power water supply, settling ponds and sewage treatment facilities. An accommodation camp is not planned for early mine life, though will be reviewed in early operations. Personnel will initially be transported from Hope Vale and Cooktown by bus or water taxi, (proposed to operate between Cooktown harbour and the NPBR).

Power transmission lines do not extend beyond Hope Vale. The power requirement at GSSP is 2.2Mw and will be delivered initially by rented diesel generators which are located at plant, services and NPBR. A hybrid solar-diesel system is included in DFS Power Studies for the processing plant, though is unlikely to be installed until early mine life.

Water bores will operate with dedicated generators and service lines to mine, infrastructure and NPBR, delivering 850Ml/yr. The system will be automated, requiring minimal maintenance. Major pump rebuilds and replacement will be completed at vendor facilities in Cairns and Townsville. It is expected that 80-85% of water abstracted will be returned to dunes.

Potable water will be delivered by a modular water treatment plant. Treated water will meet NHRMC guidelines. Wastewater will be collected from the Infrastructure Area and the NPBR and pumped to the wastewater treatment plant (WWTP). This is proposed to be a package plant with resultant water discharged to a designated irrigation area.

Diatreme is reviewing the Starlink system which will provide communications at site on phone and internet. They system is rolling out in late 2021 and expected to deliver 50-150mb/s service in most locations. Additional equipment to provide cellular voice and broadband data capability.

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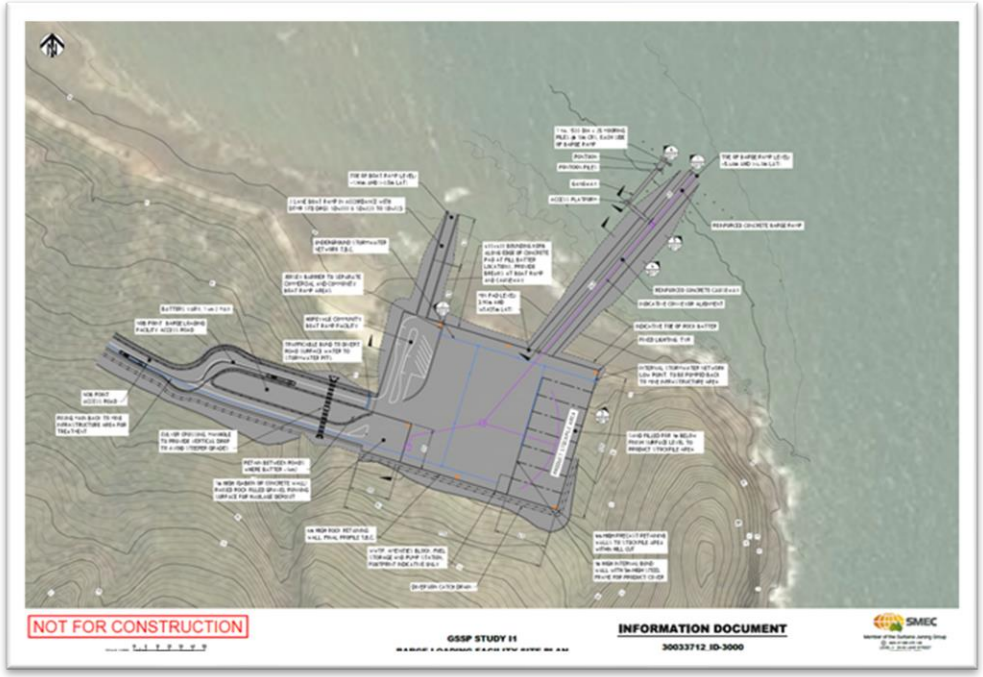
INFRASTRUCTURE – NPBR

The materials handling system consists of elements from the mine product stockpile through to the barge loading conveyor at NPBR. Loading will comprise of a single stream FEL operating on the stockpile area. The FEL will load to a hopper-feeder arrangement to control the flow onto the product conveyors operating from the product stockpile, though to an emergency stockpile within the NPBR area. A diverter chute will deliver the silica product to the emergency stockpile or direct to barges at a loading rate of 1,000 tph. The elevated conveying system rate is designed to optimise barge cycling during OGV loading. The NPBR infrastructure area includes:

- Hardstands for temporary stockpiles
- Barge Ramp - NPBR (150m long rock/concrete structure) designed by SMEC and costed by local contractor Pacific Marine Group Pty Ltd. The concept included a concrete barge ramp, hardstand / storage area, pontoon landing for crew access and recreational boat launching facility
- Floating pontoon structure (Relocatable) – preliminary design by Wave Internationals, to be upgraded in DFS
- Intermediary transfer conveyor
- Radial telescopic stacker conveyor (ST01) facilitates loading of 8,500dwt barges. Loading should be completed solely by slewing and luffing and not require shuttling of the stacker or warping of the barge along mooring piles. CV04 will be required on the pontoon structure to transfer material from CV03 to ST01
- Amenities block along with a WWTP, Fuel storage Pump station returning all water to the mine pond.



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SHIPPING

The PFS considered transhipment via barges to Handymax (35,000 dwt) and Supramax (55,000 dwt) OGV's, both fitted with cranes and matched grabs of about 8 - 10 and 12 m^3 respectively. Two scenarios were considered for barging:

- 3 large barges 8,500 dwt and 2 larger towing tugs and 2 smaller assist tugs
- 2 large barges 8,500 dwt and 1 larger towing tug and 1 smaller assist tug

Ship loading rates have been assessed using desktop simulations to vary the type of OGV, tug and barge arrangements. Even with the relatively long distance to the potential anchorage (55km), ship loading rates are commercially viable and easily achieved. Stevedoring onboard delivers training and employ opportunities for nearby communities, with marine personnel also located in the area to operate the tugs.

Maximising ship loading rates is reliant on a maximum number of cranes with operations on a 24-hour basis, to avoid excessive costs on demurrage. The barge loading rate (1,000tph) is feasible for the smaller production tonnages (750Ktpa) and smaller ships; however, the barge loading occupancy reaches a peak of 80% at times, indicating a potential bottleneck if the project expanded its annual tonnage past 1.32Mtpa. Raising the barge loading rate to 1,500 or even 2,000 tph maybe advantageous as a process improvement exercise during operations.

Weather patterns and sea conditions are considered suitable for transhipment operations in the CFP anchorage area. This is located to the north of existing CFP berthing facilities. Diatreme is working with Ports North on a transhipment solution and MOU. An engineering study on a Dolphin arrangement at the extent to the CFP wharf is also underway and will complete during the DFS. Preliminary infrastructure cost estimates are included in the PFS.

Pilotage of OGV's will be necessary within the Great Barrier Reef Marine Park (GBRMP), though barge operators may be trained as pilots to reduce costs.

Metro Mining Barge Loading with Radial Stacker and Cape Flattery Port

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CONSTRUCTION EXECUTION

The DFS will deliver tendered pricing on all work packages and move PFS level costing to a +/- (10-15)% level of certainty. Permitting requirements and timelines are already well defined in schedule and resourced. Risk assessments will be further upgraded during DFS (including HAZID/HAZOP) and integrated Tier 3 schedule developed to allow management of the project from procurement through procurement, construction, operational preparedness and commissioning. Cost control systems will be established in Q1-2, 2022.

The GSSP construction includes the installation of equipment and facilities for mining, a wet processing plant (including spirals, attritioners, classifiers, magnetic separators), ancillary plant facilities and non-process infrastructure for operations. Construction will be implemented using a combination of EPC for the processing plant and NPBR with mining, stockpile and services infrastructure completed by an owner managed arrangement. Wherever possible equipment is modular and constructed off site, minimising on site construction to around 4 months.

Diatreme will appoint an Owners representative to oversee the EPC contractors. An owners project and construction management team will be based at the site. Vendors selected in DFS and subject to FID, will procure equipment in Q1-Q2, 2022. Site delivery is scheduled between 5-7 months later. Members of the intended procurement and construction team are already involved on PFS and DFS.

Quality assurance and cost control onsite will ensure that commercial, quality control programs, standards, test methods and procedures are implemented. Progress inspections will be performed to ensure construction is compliant with drawings and specifications and have Issue and Closeout non-conformance reports (NCRs.) Quality assurance will ensure that quality control documentation is completed by the vendor inspection services for vendor supplied equipment, materials and fabricated items and that manufacturing data reports (MDRs) are received and incorporated during commissioning and handover to Diatreme.

Key Performance Indicators (KPIs) to drive project execution success. These have been structured around Health, Safety and Environment, Local Participation, Capital Cost, Schedule, Plant throughput and Product specifications. An Integrated Management Team (IMT) will support the execution of the Project. The IMT approach provides Diatreme with the opportunity to incorporate key Operations staff into the Project Management Structure for risk management, training and continuity through operations readiness.

A total of five Contract Packages and One Owner's Package has been identified for the execution of the project scope.

- CP0 - Owner's team and projects
- CP1 - Site development and bulk civils
- CP2 - Process plant
- CP3 - Overland Conveyor
- CP4 - Barge Loading / Marine Infrastructure
- CP5 - Infrastructure and Services.

Commissioning and performance assessment of the process plant, conveyors and NPB is included in EPC.

Commissioning of the Ancillary infrastructure will be completed by the SMP contractors.

The key objectives of the execution phase of the Project are set out below:

- **'Zero harm' to people and the environment in delivering the Project Execution**
- **Minimise overall project cost**
- **Maximise value and deliver the Project within budget,**
- **Complete the works within the approved schedule, meet the Project's identified key performance indicators**
- **Conform to statutory requirements and Diatreme's corporate requirements**
- **Develop and maintain relationships with stakeholders**
- **Seek to actively engage the local workforce and contractors wherever feasible to do so and undertake the project with no industrial disputes and with no adverse industrial legacies for the on-going operations.**

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PROJECT IMPLEMENTATION AND OPERATIONAL PREPAREDNESS

Diatreme leadership team manages business risk and aligns corporate polices to operational systems. As per Queensland legislation, the SSE is the site principal responsible person. The GSSP General Manager and team will plan, manage, verify the quantity and grade of the ore extracted from the mine pits with the assistance of Diatreme technical services personnel.

Product reconciliations systems are being drafted during the DFS to demonstrate approaches to be implemented towards maintaining product qualities on stockpiles and though the transhipment process.

Mining will commence three months prior to commissioning. The mobile equipment required for mining will be leased by Diatreme. This earthmoving equipment will be used for the site wide construction earthworks and will be operated by Diatreme employees. Mining preparation will include stripping and stockpiling soil/vegetation with a dozer, levelling of initial mining area, siting mobile grizzly and trommel, pumps and connecting pipeline systems to plant.

Site preparation, road upgrades and bulk civils will be Owner managed with a team of operators, sourced locally where possible. Survey control and hence quantity verification to set outs, will delivered by a Owners survey team.

The processing technology associated with the plant is proven and well understood presenting minimal risk as to its application and output. As several KPIs have been identified with the Process Plant (Plant feed input tonnage, product tonnage and quality) DRX will engage trainers from the EPC contractor to assist in delivery handover to Diatreme Operations personnel.

The overland conveyor system is a technically simple piece of infrastructure, and lends itself to direct procurement within a Australia (radial and NPBR barge loader) and packages overland conveyor (Fabrication in Chine or Australia). Engineering will be completed by Wave who may also be engaged to assist with operational preparedness.

Ancillary infrastructure, pumping systems, ponds, piping & electrical services, buildings, workshop, generator connection, electrical will be Tendered to manufacturers in Queensland who will deliver support into operations. Interfaces to Plant/Conveyor/Nob Point EPC packages determined in DFS.

Operational preparedness, including all HSEC processes are underway and will advance in Q1-2 2022. General procedural systems and site administration will be developed as the project transitions through operational preparedness. The operation will conform to design criteria, mining and processing schedules aligned to financial modelling.

Maintenance and inventory system development will rely on vendor data provided from the EPC contractor for the process plant and a number of Owner packages of work. Data is compiled into a WBS which will continue to be utilised in DFS and align to operational budgets. In early-mid 2022 Diatreme will engage procurement and inventory specialists to evolve the system in preparation for operations in late 2022.

Supply of reagents, logistics, waste removal, fuel and equipment deliveries and transport to and from location of dispatch will be ultimately determined closer to the execution phase of the Project. For the PFS study, vendors provided pricing as delivered to site.

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PROJECT IMPLEMENTATION AND OPERATIONAL PREPAREDNESS

Marine operational preparedness has commenced on the following:

- Offshore seabed and associated lease permitting
- Bathymetric and benthic surveys in the Cape Flattery Port
- Liaison with Ports North on collaborative approaches for utilisation of infrastructure, shipping support, Port and Marine safety to point of barge onloading at NPBR

The marine services will be contracted and train/engage operators located in Hope Vale and Cooktown. Pilot and other services will attach to existing services in the CFP.

The mine will operate 24-hours per day, 360 days/yr as required by the mine schedule (excluding planned and unplanned shutdowns).

Active CDE Plant (Tunisia)

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SAFETY

The site HSEC strategy will interface to the Diatreme Corporate strategic objectives through a leadership team, selected to operate by example and demonstrate visible leadership as an ongoing commitment. Development and implementation phases have commenced with the establishment of overarching Policies, Standards and Sustainability Principles. In Q4 2021 and Q1-2 2022 standards will be further developed for Construction and Operations. Diatreme will install an integrated HSEC database monitoring system to deliver performance monitoring which in turn delivers progressive improvement to the Health Safety Management Systems, Standards, Plans and Procedures at the GSSP site.

Five priorities will be achieved in operations through a supporting plan and program of work:

- Establishing Standards and assessing performance
- Integrated HSE/maintenance database and monitoring systems
- Risk Management (HAZOP/Risk Assessments and Registers)
- Active contractor/personnel engagement and mentoring, monitored by KPI's
- QA/QC assessment and improvement

Safety in Design : Design is proceeding in parallel with the EIS process and a safety in design process will be followed in accordance with the Australian Safety and Compensation Council's Guidance on the Principles of Safe Design for Work (2006). Civil and structural engineering design will be in line with Australian and other standards to mitigate potential impacts from natural hazards, security threats and health and safety with engineering designs signed off by a registered professional engineer of Queensland in accordance with standards appropriate to mining projects.

Health and Safety Management Plans and Policy: Health and Safety Management Plans will be implemented for all project phases in line with Diatreme's Health and Safety Policy, and all contractors will be required to meet the high standards specified by Diatreme. Plans will reference and integrate measures from the appropriate Australian standards as per the Guide to Standards for Occupational Health and Safety (SAI Global 2013).

Traffic Management Plan: A Traffic Management Plan will be implemented for construction, operations and decommissioning to reduce risks associated with road transport.

Environmental Management Plans: Two Environmental Management Plans have been produced in the EIS for terrestrial and foreshore-marine areas

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SAFETY

Marine Operations Management Plan: Diatreme is working with Ports North on Marine safety. A framework Marine Operations Management Plan has been prepared to reduce the potential for negative impacts on the environment, vessel safety and operational efficiency with maritime operational activities (barging and coastal shipping) as a result of the project. Relevant processes and procedures related to shipping and port operations including:

Quarantine and customs, vessel security reporting, communications (e.g. VHF), compulsory pilotage, port navigation and movement restrictions, safety procedures including requirements for fire response and evacuation, emergency plan responsibilities, Marine incidents, Environmental incident reporting requirements, Security requirements for notification prior to entering the port, security zoning and reporting.

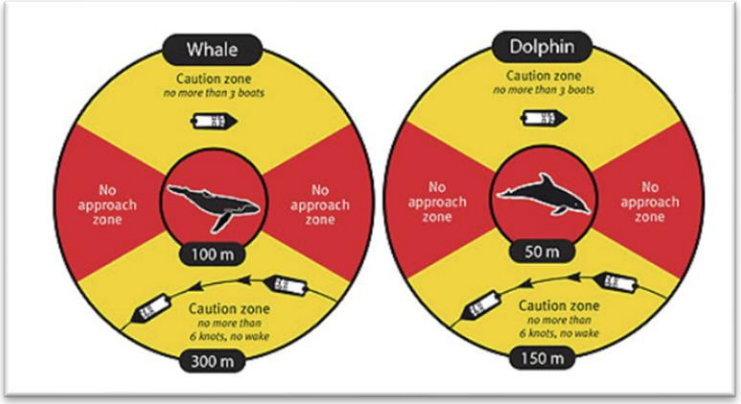
Reef VTS is a coastal vessel traffic service (VTS) dedicated to the Great Barrier Reef and Torres Strait mandatory ship reporting system (SRS) operated under joint federal and state arrangements between Maritime Safety Queensland and the Australian Maritime Safety Authority (AMSA) from the Reef VTS centre at Townsville. The purpose of Reef VTS is to enhance navigational safety in the Torres Strait and the inner route of the Great Barrier Reef.

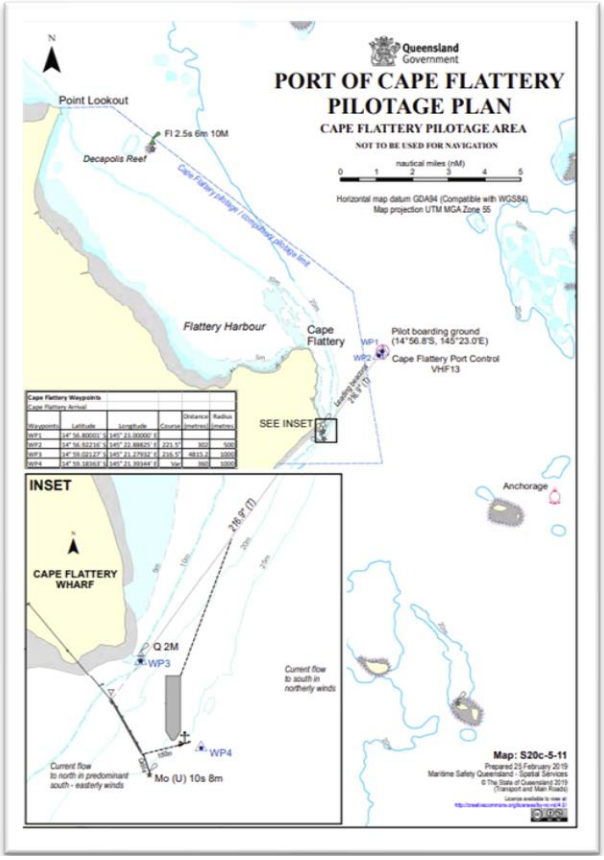
Security Management Plan: The Port of Cape Flattery Transfer is a Regulated Port under the *Maritime Transport and Offshore Facilities Securities Act 2003* (Cwlth) and has an approved security plan in place. This will be in place for all phases of the Operation.

Emergency Management Plan: communications in the Hope Vale Aboriginal Shire are poor Diatreme will providing reliable communications at the mine in the interests of effective disaster management and safety. GSSP will utilise satellite emergency phones and EPIRB systems both on land and for Marine.

GSSP is remote and located in a monsoonal flooding and cyclone prone area. Surrounding regrowth vegetation is also prone to bushfire.

Emergency evacuation of injured personnel is primarily reliant on the Royal Flying Doctor Service and Emergency Management Queensland helicopter service based in Cairns. The site Emergency Response and disaster management system will be integrated to the Hope Vale Council Disaster Management Plan and the Ports North Marine Operations Plan.





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PERSONNEL

An Operations team will need to be developed and prepared in parallel to facility design, construction and commissioning. The average operational manning estimate is approximately 82 people, including management, contract mining, catering, and laboratory and excluding Brisbane based staff.

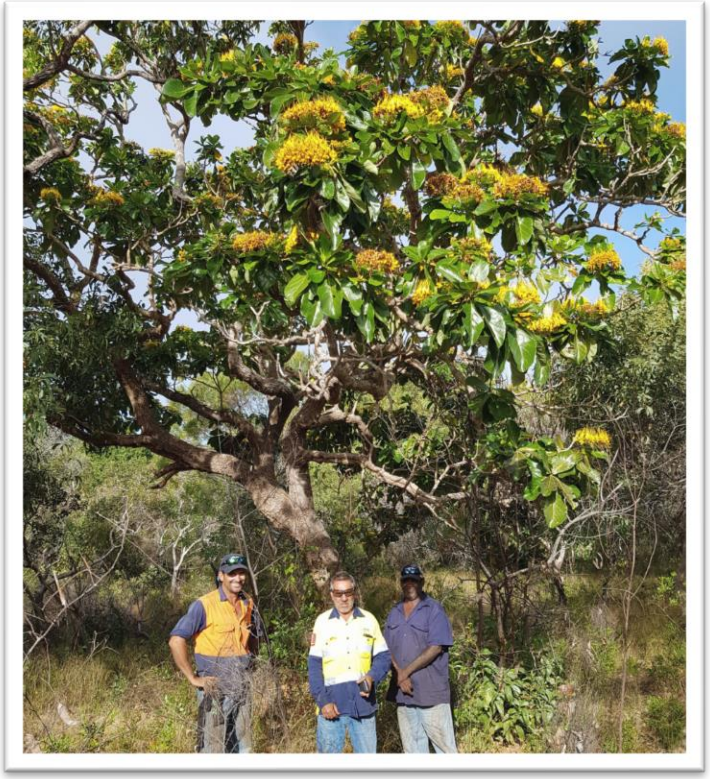
Construction personnel will be sourced by Vendors for on site. Civils construction will be supported by an Owners team which includes Supervisors and trained local operators. External equipment suppliers (bulk equipment transport, cranage, support equipment) will be sourced within North Queensland.

Approximately 47% of the workforce will be sourced from Hope Vale and Congress is undertaking a skills assessment review in preparation for engagement of personnel at the GSSP. Early personnel engagement, training and then a continued transition into mentoring in early mine life is required.

Operations are planned on a 24hr/day, 360 days/yr basis as required by the mine schedule (excluding planned and unplanned downtime allowances). Personnel will be required as follows:

- The mine will operate on 12-hour shifts, nominally from 6am-6pm
- Administrative and day workers - 5 days per week, excluding public holidays
- Shift workers - 14 or 7 days on and 7days off (average over the year)
- Shift personnel will work between the mine, processing infrastructure area and the NPBR in association with the regular loading cycles, (nominally 22 ships per year).
- Around 60% of personnel at the mine will be engaged via an Indigenous Employment Agency supported by Diatreme, or for senior roles employed directly by Diatreme. Contractors and consultants will also be engaged on the site as required for specialist and auditing purposes.

Specialist contactors will be sourced from Cairns or beyond. As there is currently no suitable motel-style accommodation in Hope Vale, these occasional workers will stay in Cooktown and commute to the mine daily. The distance is approximately 70 km and travel time is just over one hour by road. Boat transport from Cooktown is also being considered and will reduce travel time to the mine site. A draft Fatigue and Safety Management Plan (subject to site risk assessments and finalisation for operations) will be prepared as part of the suite of statutory management plans



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OPERATIONS

Diatreme will develop the Project with a blended style of operations, using specialist contractors for key activities (e.g. mining, logistics) and support services (accommodation village management), while managing an in-house workforce for process plant operations and overall project management and supervision. The Project will operate within the guidelines of the Project design with operational areas being managed to capacity to maintain all aspects of plant operation.

Diatreme will Owner Operate mining and planned maintenance activities. Mine management, planning, technical and geological activities will be the responsibility of Diatreme employees and consultants.

A Personnel and Contractor Management Platform will be implemented which will encompass the full lifecycle of personnel-contractor management, including; prequalification, onboarding selection and engagement and the management of contractors.

Industrial Relations systems will be developed in alignment to the Fair Work Act during the operational preparedness activities in Q2-3 2022.

The materials stockpiled will reduce pressures on mining during the initial 2-3 months and allow a focus on plant and product delivery.

Water bores will operate with dedicated generators and service lines to mine, infrastructure and NPBR, delivering 850Ml/yr. The system will be automated, requiring minimal maintenance. Major pump rebuilds and replacement will be completed at vendor facilities in Cairns and Townsville. It is expected that 80-85% of water abstracted will be returned to dunes.

General Procedural systems and site administration will be developed as the project transitions through operational preparedness.

Operational requirements post initial road upgrades (Alberts Camp Road) and development of the Nob Point Road (NPR), are limited to periodic maintenance and dust suppression. This will be delivered through mine operations personnel utilising the Diatreme fleet. Locally supplied resurfacing material is available from local quarries.

The initial Information Management (IM) plan for Diatreme Resources' (Diatreme) operations at the GSSP and offices outlines an integrated Information and Communications Technology (ICT) system, including a private end-to-end telecommunication system. Communications is a challenge in Northern Queensland and the site is reliant on satellite based systems currently being evolved and rolling out in late 2021. The alternate is a microwave link to Hope Vale or a sky muster type system located at the site. Communications to process control in the processing plant and NPBR at will be reviewed further in DFS.

IT services will support hardware and software operations, maintenance and helpdesk.

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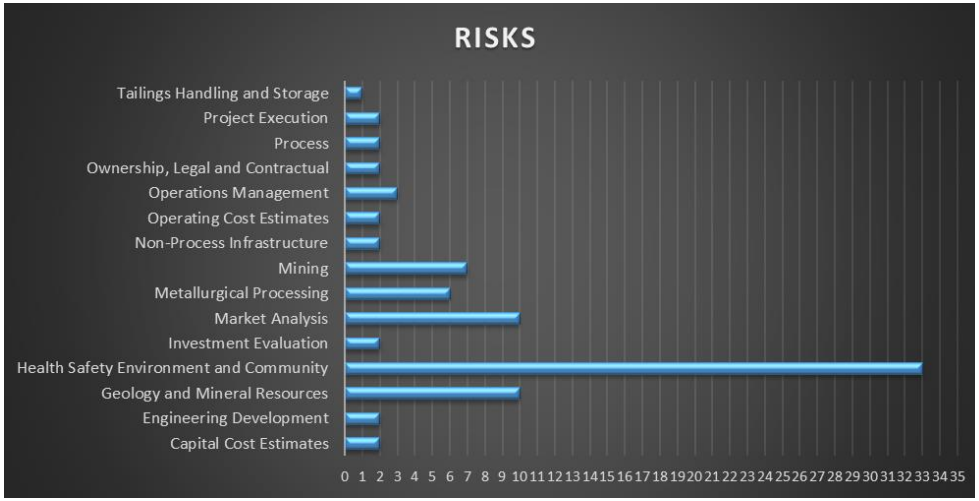
RISK

Each section of the EIS submission reviews risk and this will be also collated into the overarching site risk assessment during DFS. All cumulative impacts from the project are assessed as being low to negligible risk, with a medium cumulative risk identified as a result of the clearing of vegetation associated with the mining operation including the LRF Threatened Ecological Community. Vegetation is proposed to be progressively rehabilitated in accordance with the Progressive Closure and Rehabilitation Plan (PCRP) during and following mining operations.

The PFS established a set of assumptions to develop a broad understanding of the GSSP. This was followed by a risk review to identify, quantify and manage ongoing project risk. The identified risks and mitigation actions (and opportunities) will inform Project execution and overall development decisions to maximise the opportunities of successful delivery. The risk were recorded in a risk register which will be reviewed regularly in workshops to manage ongoing risk.



The principal risks identified in PFS are:

- Social and Environmental License
- Finalisation of environmental and mine lease permitting
- Stabilisation of shipping freight costs and potential disruptions to shipping during operations
- Market pricing on premium silica products
- Fuel and personnel costs

Processing risks will reduce one the plant design is finalised, however the residual risk on the plant reaching name plate and hence delivering on product quality remains. The Capex estimate risk will reduce in DFS post Tendering, whilst growth is not considered a high risk considering the detail in PFS costing and the modular package approach to the processing plant and associated infrastructure.

Marketing and shipping risk will reduce in DFS, once offtake is secured and market pricing is assured. Shipping represents the higher commercial risk to the project with current elevated transport rates. Fuel and personnel costs are the next highest risks to operating costs.

HSEC is recognised as a key area of the business to manage and is rated high at present, given the consequence ratings for Community or Environment in the event of Diatreme failing to meet the required standard or in the event of non-compliance.

The GSSP will lead to an increase in existing shipping movements within the region, including barge movements between the NPBR and transfer anchorages as well as OGV movements to and within the main shipping channels. The overall increase in shipping movements and equivalent is expected to be marginal comparative to the existing situation and therefore does not pose a major risk to the marine environment.

Capital cost growth is not considered a high risk considering the detail in PFS costing and the modular package approach to the processing plant and associated infrastructure.

Although different functional, technical and project-stage risks and opportunities exist, the basic process to identify and manage these risks and opportunities follows an overarching methodology. The process was broadly based on the international standard *AS/NZS 31000:2009 Risk Management - Principles and Guidelines*

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Capex

The Class 3 (AusIMM) Capital cost estimate (+/- 20%) has been prepared based on the Project scope of work. The Capital cost is $60.1m excluding contingency and based on PFS level engineering design, detailed WBS and pricing of Owners work packages from vendors.

Capital requirements align to an FID in Q1-2,2022 and commencement of site and construction activities around Q3,2022, with commissioning in Q1, 2023. This is predicated by rapid advancement of permitting through Q4,2021 and Q1,2022.

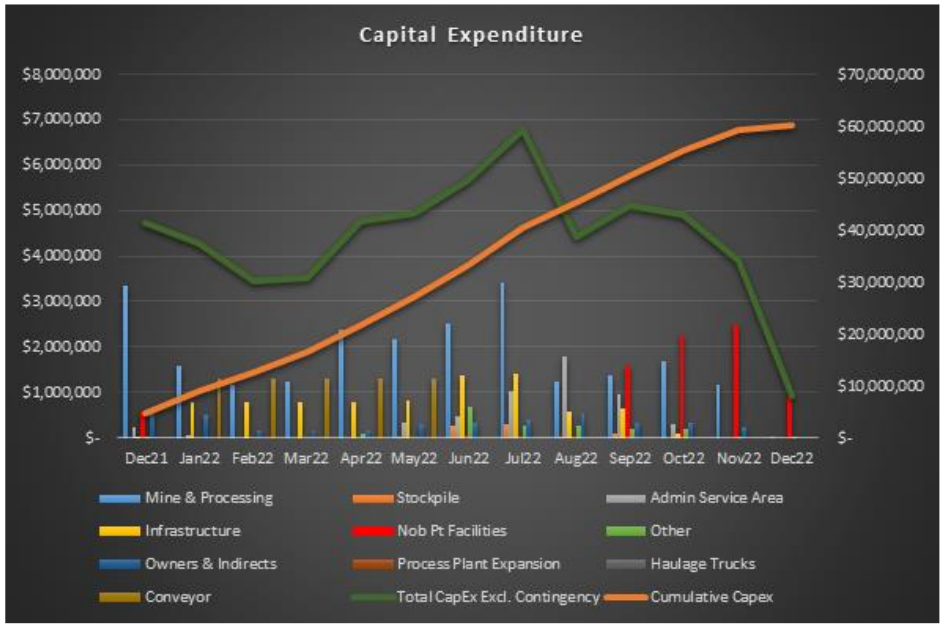
Material Take Offs (MTO) were produced for each significant element of scope listing the quantity and scope of works based on engineering drawings and equipment lists. Request for Pricing (RFP) packages were prepared from the MTO's and sent out to suitably qualified local and state-wide suppliers and contractors. Pricing received was technically and commercially evaluated by Axiom and Owner prior to entry into the estimate. Estimation for the conveyors, marine infrastructure and processing equipment were prepared by MT, CDE and Wave for inclusion in the estimate.

Mining and other heavy fleet capital costs were reviewed and for the purpose of PFS only the smaller support equipment capitalised. Mining equipment related to processing (Trommel and Grizzly) will be acquired as part of the plant EPC.

Process plant estimates by CDE deliver an EPC solution. CDE are able to complete detailed engineering in 2.5 months for DFS and have produced initial PFD's for the plant which emulate and in some areas improve on the MT design. Operating maintenance costs will be reported by CDE on the basis of multiple sand process plant operations and this data will update in DFS.

Ancillary Infrastructure development and Owners Representative will be delivered by an Owners Projects and Construction Management team. Members of the team are already involved on PFS and DFS and fully costed.

Self-bunded fuel and power systems are budgeted at the project during Construction.



Capital Summary

Area		$A (m)
Mine & Processing		23.3
Stockpile		0.7
Administration Service Area		5.1
Infrastructure		8.1
NBPR Facilities		7.8
Other		1.8
Owners & Indirect		4.0
Process Plant Expansion		2.8
Conveyor		6.6
Contingency	11.0%	7.8
Total Capex		67.9
Total Capex Excl. Contingency		60.1

Contingency allows for variation in Engineering design by CDE through the DFS. Overall contingency has been determined at 11% across all disciplines. Contingency will be allocated on a package basis in DFS.

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Opex

Operating cost estimates were obtained through a Request for Pricing on the basis of work packages. The estimate accuracy ranged from 15-25%. Line items in WBS have also been estimated on the basis of industry knowledge where costs are minor and vendor pricing was not available. Contingency and escalation has not been applied to Operating costs.

Vendor packages quoted as Capex packages, also included estimates on maintenance and consumables. The focus of the RFP process was supporting businesses in the Cairns-Cooktown region and aligning to a priority on business development in Cooktown-Hope Vale. Mareeba also represents a hub for provision of services, as local industry is geared to support the Tablelands agribusinesses and associated businesses. Specialist providers are also located in Townsville to support the operational supply and maintenance requirements.

Mining and site operational costs have been developed from a cost build exercise utilising known rates, productivities and availabilities for fleet, maintenance, personnel, fuel and ancillaries. Vendor pricing was also obtained though considered excessive in preference to developing an owner managed team on site.

Logistical support including land and sea freight are well established in the north Queensland region. There is a current high demand for maintenance service providers due to elevated activity in construction and services provision to housing, general civils and mine developments. Commonwealth and state funded road development projects are driving consumption of raw materials and concrete products.

The majority of equipment and vendors required for maintaining service conveyors, heavy fleet, marine infrastructure and boats are located between Townsville and Cooktown. Marine bulk handling is also well supported in the gulf. Interaction with Ports North on transhipment solutions has provided detail on ports charges and facilitated ongoing studies on marine transhipment options/costs.

Barge and shipping estimates are derived from quoted pricing from bulk transport groups. Wave International has also built up scheduling and costs from first principles to evaluate bulk handling logistics and associated operating costs.

Opex Summary

Opex - Fixed	A$/t mined	A$/t Product	$A (m)
Mining & Processing	2.55	3.22	99.8
Stockpile	0.13	0.17	5.3
Admin Service Area	0.40	0.50	15.6
Employment	7.99	10.06	312.1
Owners & Indirects	6.69	8.42	261.2
Conveyor only to Nob Pt	0.30	0.38	11.7
Total Opex-Fixed	18.06	22.75	705.7
Opex - Variable			
Barge and Tranship	7.94	10.00	310
Cape Flattery Port costs	0.89	1.12	35
Total Opex - Variable	8.83	11.12	345
Totals			
Total FOB	26.90	33.87	1,051
Export Ship – Supramax & Marketing	20.03	25.22	783
Total CIF	46.93	59.07	1,834

- *Owners indirects include corporate overheads, ocean freight and site Energy(fuel).*
- *Fuel cost base is $1.23/l (pre rebate)*
- *Steady state personnel numbers (82) exclude contractor personnel costs include in rates*
- *Fuel burn rates are provided by vendors for generators, barges, OGV's*
- *Government and landowner royalties applied*
- *Bulk shipping rates relay on vendor long term forecasts*
- *Barge rates including maintenance are supplied by vendors*

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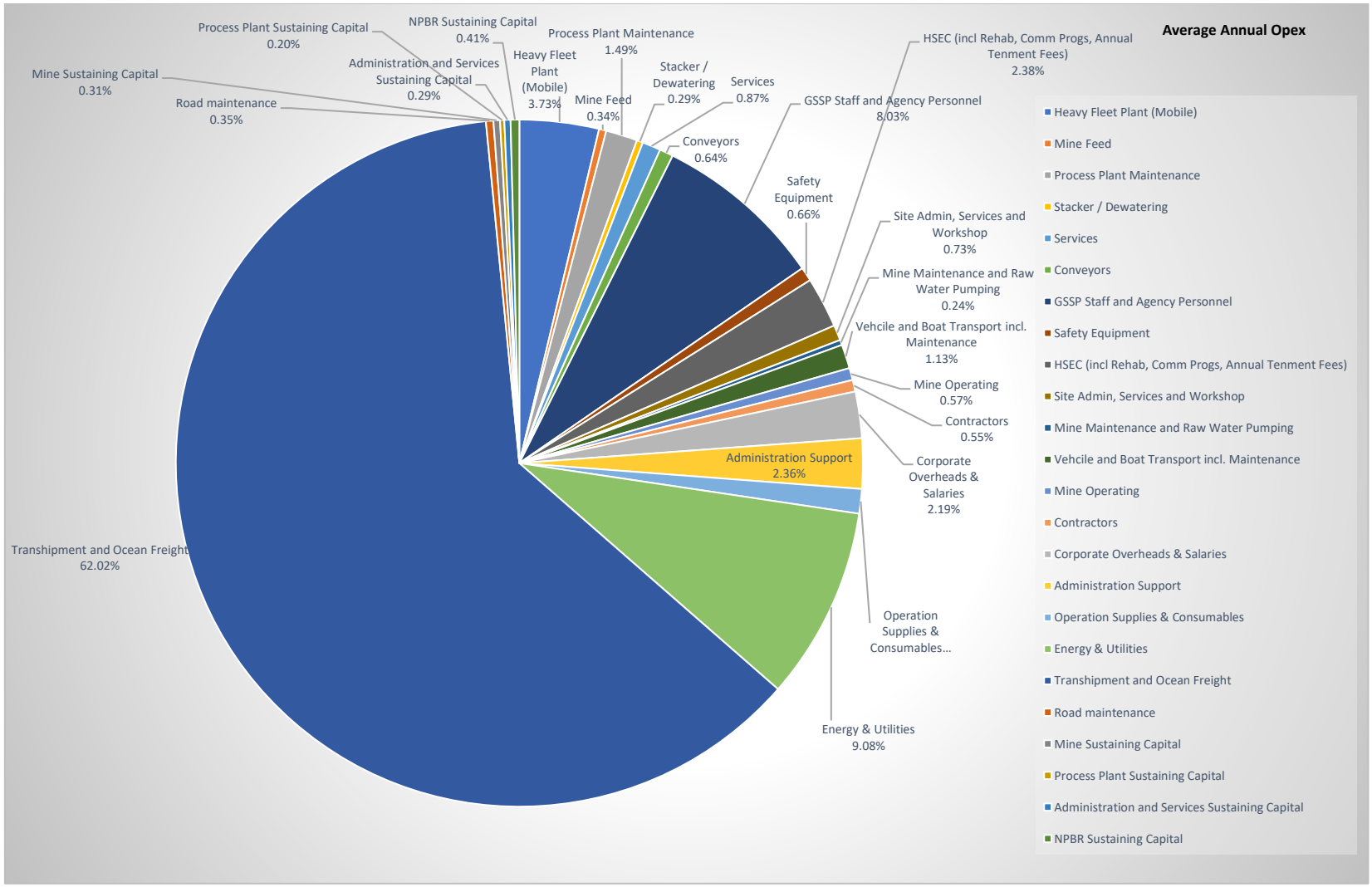
Opex DISTRIBUTION



Sustaining Capex ($35m LOM) is included in the Opex model and has been estimated from rates acquired from vendors and typical durations for equipment replacement. Larger package allowances include minor and major fleet rebuilds (CAT detailed schedule and pricing), changeout of fleet at 5 year (30-35k hours), boat replacement at 10 years, full replacement of ablutions and potable treatment plants at 10 years, provision for plant and conveyor major component changes at 5 years and dolphin installation on the extension to the Cape Flattery Port facility allowing improved ship mooring for trans-shipment.

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CONTRACTS

The contracts strategy in DFS utilises established relationships with vendors and a priority on support to regional businesses. Tenders will include AS forms of contract on all packages and return estimates to align with the established WBS.

EPC is preferred for the processing plant and NPBR infrastructure. CDE are already undertaking detailed engineering on processing plant for completion and pricing for plant is expected in Q1 2022. Wave are appointed to deliver Marine engineering, Owners infrastructure engineering and Marine operational planning. This will include Conveyor design and electrical design across the site.

Owners civils, piping and E&I contract packages will follow a typical SMP format. In the absence of improved vendor pricing bulk earthworks will be Owner managed with early onsite delivery of mine and ancillary fleet.

Modular supply packages will be Tendered to known vendors on power, fuel tanks, workshop, laboratory buildings, effluent and potable water, pumping and piping. Installation will be completed under the SMP package. Ancillary light and bulk freight supply is already in place for the site. Marine supply barging from Sea swift is an options for the site and vendor pricing is known.

Road and culvert design by SMEC engineering requires no further updating.

Marine bathymetry and benthic surveys, along with CFP wharf engineering studies are awarded. Tendering for the wharf extension via dolphins will not be completed until operations.

Operational contracts requiring negotiation include:

- *Fuel and lubricants supply, flocculent supply, heavy fleet leasing and parts supply, generator rental (fully maintained), freight rates, general, process plant and conveyor parts supply, vehicle rental (in place), communications, road maintenance (Hope Vale Aboriginal Council), small business contracts, ancillary earthworks contractor, electrical support, pump maintenance.*

General supply contracts will be established with a number of local suppliers and vendors in the region.

Product offtake agreements will be developed during DFS with a number of existing interested parties.

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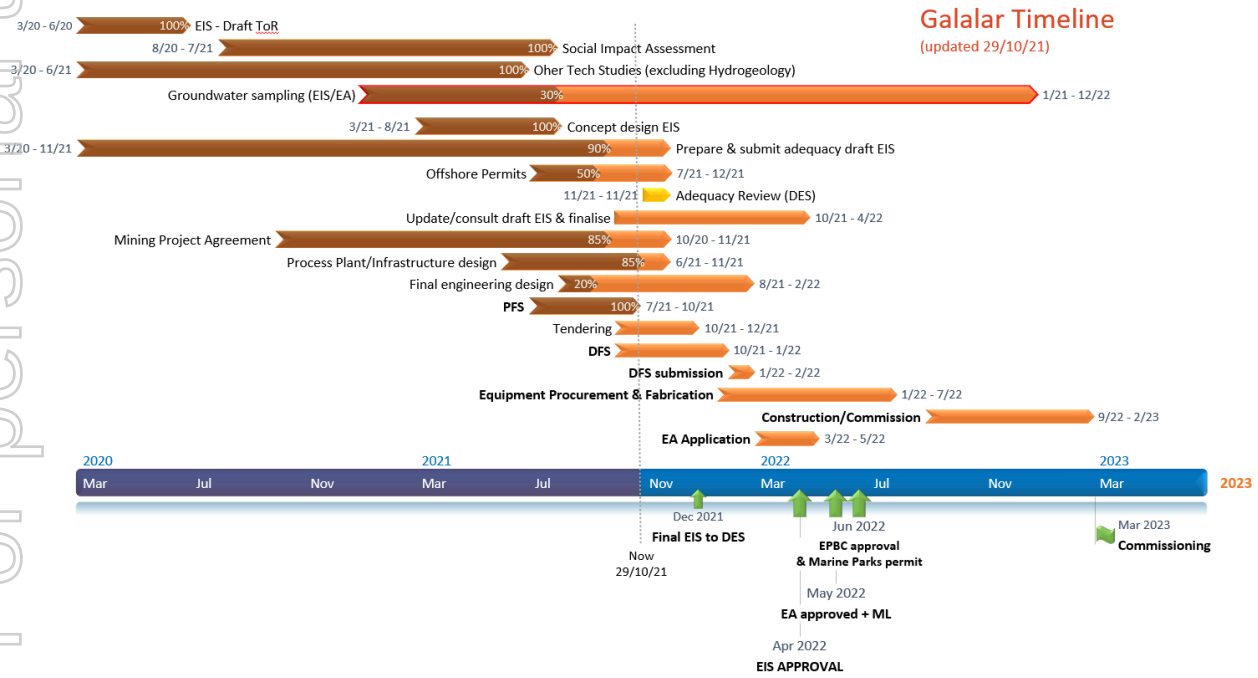
DFS AND ADVANCE TO FID

The DFS will be managed by Diatreme technical personnel. The following DFS team has been formed to complete updates to the PFS through Q4, 2021-Q1, 2022.

Tendering commences in November 2021 with preferred vendor selection in early 2022.

The Project Development Schedule (12months) is currently forecasting a Q1 2023 commissioning; however the critical path is advancement to EIS permitting in Q4 2021. Public notification and community consultation will be advanced through November/December 2021. Further detail will be incorporated to the schedule during the DFS.



Resource	Deliverable
DIATREME Resources	DFS management, mine/process engineering
wave international DETERMINE · DESIGN · DELIVER	Conveyors, NPBR, Marine, CFP engineering study, DFS report update, HAZID/HAZOP
AXIOM PROJECT SERVICES PTY LTD	Schedule, Tendering, Owners Package Review, Project Controls, DFS reporting on Tendering/contracts.
	EPC (Process Plant). HAZID/HAZOP (only Engineering awarded)
HLB MANN JUDD ADVISORY AND ACCOUNTING	Commercial inventory and maintenance systems
wogen	Marketing and Shipping
BLACKBIRD PARTNERS	Financial modelling and evaluation
BMT	Marine surveys and permitting
ener-g	Power/Solar power optimisation studies
Ports North	MOU Port usage and Fees
Lawyers McCullough Robertson	Legal
Sustainability, HSEC	Linda Kingston
rbo consulting	Indigenous Employment Agency Business Plan
AUSROCKS CONSULTING MINING ENGINEERS	Mining/mineral reserves
ENVIRONMENT NORTH ENVIRONMENTAL MANAGERS & PLANNERS / PANDANUS ENVIRONMENTAL NORTH STRADBROKE ISLAND	Updates to EIS and Environmental

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GLOSSARY

Term	Definition
$ or US$ or USD	United States Dollars
Al2O3	Aluminium oxide
AusIMM	Australian Institute of Mining and Metallurgy
CaO	Calcium oxide
Capex	Capital Expenditure
CIF	Cost, Insurance, and Freight
Competent Person	The JORC Code requires that a Competent Person be a Member or Fellow of The Australasian Institute of Mining and Metallurgy, of the Australian Institute of Geoscientists, or of a 'Recognised Professional Organisation'. A Competent Person must have a minimum of five years' experience working with the style of mineralisation or type of deposit under consideration and relevant to the activity which that person is undertaking.
DFI	Development finance institution
DFS	Definitive Feasibility Study
E&I	Electrical and Installation
EPC	Engineer, procure and construct
FEL	Front end loader
Fe	Iron
Fe_2O_3	Iron (III) oxide
FID	Financial investment decision by the Board of Diatreme
FOB	Free on board
Indicated Mineral Resource	An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade(or quality), densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit
Inferred Mineral Resource	AnInferredMineralResourceisthatpartofaMineralResourceforwhichquantityandgrade(orquality)areestimatedonthebasisoflimitedgeologicalevidenceandsampling.Geologicalevidenceissufficienttoimplybutnotverifygeologicalandgrade(orquality)continuity.Itisbasedonexploration,samplingandtestinginformationgatheredthroughappropriatetechniquesfromlocationssuchasoutcrops,trenches,pits,workingsanddrillholes
IPP	Independent power producer
IRR	Internal rate of return
IT	Information technology
JORC	The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves 2012 Edition, as published by the Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia.
kt	Thousand tonnes

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kV	Kilovolts
Measured Mineral Resource	A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade (or quality), densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit
MG12 spirals	A new high-performance spiral separator from Mineral Technologies
MgO	Magnesium oxide
Mineral Resource	Mineral Resources are a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade (or quality), and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade (or quality), continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories
MAP	Mine Area Plant
Mt	Million Tonnes
Mtpa	Million tonnes per annum
MW	Megawatt
Fe_2O_3	Iron Oxide
Ore Reserves	Ore Reserves are the economically mineable part of Measured and/or Indicated Mineral Resources. Ore Reserves are sub-divided in order of increasing confidence into Probable and Proved categories.
PFS	Pre-Feasibility Study
PPM	Parts Per Million
Probable Ore Reserves	The economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Ore Reserve is lower than that applying to a Proved Ore Reserve.
PDC	Process Design Criteria-Processing Plant
Proved Ore Reserves	The economically mineable part of a Measured Mineral Resource. A Proved Ore Reserve implies a high degree of confidence in the Modifying Factors.
RWG	Resettlement working groups
SMP	Structural Mechanical Piping
Scope 1 emissions	Direct emissions from company-owned and controlled resources. In other words, emissions released to the atmosphere as a direct result of a set of activities, at a firm level. It is divided into four categories: stationary combustion (e.g fuels, heating sources). All fuels that produce GHG emissions must be included in scope 1.
Scope 2 emissions	Mobile combustion is all vehicles owned or controlled by a firm, burning fuel (e.g. car, vans, trucks). The increasing use of "electric" vehicles (EVs), means that some of the organization fleets could fall into Scope 2 emissions.

SiO_2	Silicon dioxide
SL	Slime or clay
SMP	Structural mechanical and pipework
Solar PV	Solar photovoltaic system
t	Metric tonne
tph	Tonnes per hour
UCC	Up current classifier
WBS	Work Breakdown Structure

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DIATREME Resources

JORC CODE, 2012 EDITION – TABLE 1 REPORT (SECTIONS 1, 2, 3 & 4)

GALALAR SILICA PROJECT: ESTIMATION AND REPORTING OF ORE RESERVES – NOVEMBER 2021 PFS

Section 1 Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (e.g., 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 (e.g., '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 (e.g., submarine nodules) may warrant disclosure of detailed information.*	• One (1) metre samples were collected from hand-auger, air-core and vacuum drilling programs. A number (35 holes) of early staged air-core holes were drilled at three (3) metre intervals and several within the resource have been "twinned" and sample on 1m intervals to confirm normalisation to one (1) metre intervals is appropriate. All material intervals were sampled. • Hand-auger holes were sampled in 1m intervals with 1-2kg (~50% of drill material returned via the auger) collected and bagged. Carew was taken to remove possible contamination from the Shell Auger. • The air-core drill collected cuttings from a cyclone mounted rotary splitter with approximately 3-4kg (~20% of drill material returned via the cyclone) samples collected and bagged. Sample chute was cleaned between samples and regular cleaning of cyclone to prevent sample contamination. • The vacuum drill collected cuttings from a return cannister with 2-3kg (100% of drill material returned by the vacuum drill rig) samples collected and bagged (calico sample bags). Subsamples of approx. 500g to 1kg were speared and separately numbered, bagged and sealed ready for assaying as drilling progressed. • Where bulk samples are collected, 100% of sample from cyclone is collected and a 'spear' sample is collected for geochemical analysis. • Samples were submitted to ALS Laboratories (Brisbane) for drying, splitting (if required), pulverization in tungsten carbide bowl, and XRF (XRay Diffraction) analysis. • Sampling techniques are mineral sands "industry standard" for dry beach sands (silica/SiO_2) and for low levels of impurities. • As the targeted mineralisation is silica sand (quartz/SiO_2), geological logging of the drill material is a primary method for identifying mineralization. • Metallurgical samples are composited intervals of white and cream sands logged in drilling with collection of the entire volume of air-core drill cuttings from the cyclone/hand-auger samples into large bulk samples bags.
Drilling techniques	• *Drill type (e.g., core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (e.g., core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is*	• Three (3) drilling techniques were used. Namely hand-auger, air-core and vacuum. All holes were drilled vertically. • One hundred and ninety-one (191) drillholes (air-core and vacuum) were

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Criteria	JORC Code explanation	Commentary
	oriented and if so, by what method, etc).	used for the Mineral Resource Estimate. The average depth is 15m. • Twenty-four (24) hand-auger holes (55mm diameter), drilled to an average depth of 3.9m, were used for the Mineral Resource Estimate. One auger-hole was extended to 7m depth. • Air-core drilling (NQ size) was by Diatreme's owned 4x4 truck mounted drill rig using a blade bit with 3m runs sampling every metre. • 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.
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.*	• Air-core and vacuum drilling achieved 100% sample recovery throughout. • Some hand-auger holes experienced partial hole collapse in the first meter in dry conditions but measures were taken to ensure representative sampling. • No sample bias occurred between sample recovery and grade. • Air core was able to penetrate up to 5m into damp clay basement or wet sands before termination. Vacuum drilling terminated immediately when damp clay basement or wet sands were intersected.
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 was completed onsite, with retention of sample in chip trays to provide a visual sample record, photography and to allow subsequent re-interpretation of data if required. • Every 1m sample interval was geologically logged. Logging includes qualitative descriptions of colour, grain size, sorting, induration and estimates of heavy minerals, slimes and oversize utilising panning. • Logging has been captured through field drill log sheets and transferred via excel spreadsheets with daily update of field database and regular update of master database.
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. • The air-core drill collected cuttings from a cyclone mounted rotary splitter with approximately 3-4kg (~20% of drill material returned via the cyclone) samples collected and bagged. • The vacuum drill collected cuttings from a return cannister with 2-3kg (100% of drill material returned by the vacuum drill rig) samples collected and bagged (calico sample bags). Subsamples of approximately 500g to 1kg were speared and separately numbered, bagged and sealed ready for assaying as drilling progressed. • Sample size (500g - 3kg) is considered appropriate for the grain size of material. Average grain size is 87% material by weight between 0.125mm and 0.5mm.

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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 for all exploration samples. • There is an alternative ICP method which has lower detection limits for the other oxides such as Fe_2O_3 and Al_2O_3, but the SiO_2 assay is determined by calculation and not a measured quantum. • Assay methods employed are designated ME-XRF26 (whole rock by Fusion/XRF) and ME-GRA05 (H_2O/LOI by TGA furnace). • In 2021 LOI analysis was changed to ME-GRA05x method. • Assaying was primarily to determine the silica (SiO_2%) percentage, but as part of the method results were obtained for a range of elemental oxides, namely 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. • Internal laboratory QAQC checks include the analyses of standards, blanks and duplicates. • Further assay checking was carried out on representative drillhole composites testing by XRF and ICP (Induced Coupled Plasma Mass Spectrometry) against the original 1m assay results. This also included checks on the same composites by an external laboratory, Intertek, Perth. • Acceptable levels of precision and accuracy were established. • A total of 2,974 SiO_2 assays were used in the Mineral Resource Estimate.
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.*	• All data was captured and stored in both hard copy and electronic format. • Significant intersections were independently validated by Ausrocks against geological logging and the geological model. • Numerous holes have been twinned with air-core and some 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. • Assay data had to be adjusted in some locations for the 0-1m interval due to minor topsoil contamination.
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.*	• All drill holes were initially located using a handheld GPS with an accuracy of 5m for Easting and Northing. GDA94 Zone 55 grid coordinate system was used.

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Criteria	JORC Code explanation	Commentary
	• *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• A contract registered surveyor from Veris Ltd subsequently used a differential GPS to pick up the drillhole Easting, Northing and Elevation values. Latest drill program is yet to receive final surveys. • LiDAR topography and imagery (Veris Ltd, July 2020) 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.

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.*
		• 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 (150m-250m) 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.*	• All drilling is vertical, intersecting the dune field geology essentially normal or at 90 degrees to the dune sand formation. Drilling has been completed in ten (10) separate programs aerially across a semi-regular grid approximately 150m x 150m. • The dune profiles have been observed in a number of vertical exposures within the wider dunefield complex. The orientation of the drilling undertaken is assessed to provide representative intersections and unbiased data for the deposit.
Sample security	• *The measures taken to ensure sample security.*	• Sample collection and transport directly from the field was undertaken by company personnel following company procedures. • Samples were placed into labelled calico bags, tied, and transported daily to the Cooktown base. They were then palletised and directly truck transported to ALS Laboratories, both Townsville and later Brisbane. • Received samples were checked against the sample dispatch documents and a reconciliation report provided by the laboratory.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• Reviews were conducted internally by Diatreme Resources Limited and third-party consultants Ausrocks Pty Ltd and found to be consistent. • A 3rd party review was conducted on the July 2021 Mineral Resource Estimate Report by Resolve Mining Solutions who reported "no fatal flaws" based on

Criteria	JORC Code explanation	Commentary
		the elements reviewed.

Section 2 Reporting of Exploration Results

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 Galalar Silica Sand Project is located in Far North Queensland, approximately 200km north of Cairns and 20km north of Cooktown. The project lies in the very southern part of EPM 17795 • Diatreme was granted EPM 17795 "Cape Bedford" on 22 June 2016 for a period of 5 years targeting heavy mineral sand and silica sand. EPM 17795 is an extensive EPM comprising 147 continuous subblocks (approx. 480km^2) covering the majority of the Cape Flattery-Cape Bedford Quaternary dunefield complex. A renewal for an additional 5 years was lodged in 2021. As of September 2021, the tenure was in good standing. • Diatreme executed a Compensation and Conduct Agreement (CCA) in January 2017 and a Cultural Heritage Agreement (CCA) in June 2017 with the traditional owners, the Hopevale Congress (HVC). • The Galalar Silica Sand Project has advanced to the stage whereby a Mining Lease Application (MLA) 100235 was lodged 23 December 2019, covering 523 hectares and the vast majority of the Galalar Silica Sand Project. A second Infrastructure MLA 100285 was lodged on 10 June 2021 over 29.88ha which provides access to the proposed Barge Loading Facility at Nob Point. Additionally, two further neighbouring EPM's related to the project have been taken up by Diatreme, EPM 27265 (granted 30th January 2020), and application EPMA 27430 which covers the proposed barge loading area.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Previous exploration was carried out in the area during the 1970's by Ocean Mining and 1980's by Breen Industrial Silica Qld Pty Ltd, primarily at reconnaissance level. • There has been no other exploration since 1986 until 2016 and the granting of Diatreme's EPM 17795. • The historical exploration data is of limited use for Mineral Resource Estimation since it comprises shallow hand-auger drilling and is typically not accurately located.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• 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. • The Galalar Silica Sand Project's Galalar Deposit is located at the southern end of the Cape Flattery/Cape Bedford dune field complex, located approx.

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Criteria	JORC Code explanation	Commentary
		20km north of Cooktown. The Cape Flattery/Cape Bedford dune field fringes the coastline as a part of a large Quaternary (Pleistocene to Holocene) age silica sand mass, extending along the coastline for approx. 50km and up to 10km inland, and, averaging 25-30m in thickness, with some dunes extending over 90m high in elevation. The linear dunes have distinctive topography, striking approx. 320 to 330 degrees. • Cape Flattery Silica Mines, which 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. • The Galalar Silica Sand Project's Galalar Deposit is located just inland between two prominent coastal points, namely the Cape Bedford peninsular 6km to the north and Nob Point 3km to the southeast. The Galalar Deposit is divided into three adjoining dune sand areas known as Galalar Main, Galalar East and Galalar West. The dunes consist of transgressive, elongate parabolic dunes, variously stabilised by vegetation. The white sands are high grade, consistently averaging over 99% silica. Whilst some coloured cream, yellow and brown sands have been returned in drill samples, the silica grades remain very high and no obvious zonation or domaining has been recognised across the project area. Petrology identifies the sand as very pale white, rounded, quartzose, free flowing and clean sand. The predominant mineral grain is quartz.
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*	• A tabulation of the material drill holes used in the Mineral Resource Estimation is attached to the ASX Release. • Relative to the previous Mineral Resource Estimate (August 2021), an additional 54 drillholes and 1 auger-hole has been added. These holes are predominately infill holes in the previously defined Resource Area and exploration holes in Galalar Extended.

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Criteria	JORC Code explanation	Commentary
	▪ *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 Competent Person should clearly explain why this is the case.*	
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g., 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.*	• A cut-off grade of 98.5% silica has been used for the Mineral Resource Estimation. • No minimum or maximum grade truncations have been used. • Thirty-five (35), early holes were sampled at 3m intervals which have been normalised to 1m intervals (representing 252 assay intervals). Thirteen (13) of these holes have been twinned and sampled at 1m intervals.
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 (e.g., '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.
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.*	• Plan view of drill hole collar locations and appropriate sectional views are included in the Resource Report.
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 relevant exploration assay results have been reported.
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.*	• Mineral Resource extends below the water table in areas of Galalar East but the depths and extents are untested. • A small proportion of the Mineral Resource is located outside the Mining Lease Application area within EPM 27265. • Iron (Fe_2O_3) in various forms may potentially act as a contaminant for very high-quality "processed" end products. • Three separate metallurgical test programs have been undertaken on the Galalar Silica Sand Project. All confirmed the potential for the substantial recovery of high quality, low iron, silica sand.

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Criteria	JORC Code explanation	Commentary
Further work	• *The nature and scale of planned further work (e.g., 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.*	• Complete assessment of mining, processing, metallurgical, infrastructure, economic, marketing, legal, environment, social and government factors or any other modifying factors to enable a proportion of this Mineral Resource Estimate to be upgraded to Ore Reserve status, according to JORC Code (2012) Guidelines. • Undertake further infill drilling to best complete a semi-gridded coverage across the entire Resource Area, to upgrade the Mineral Resource categories and size and increase potential Ore Reserve size. • Extend drilling throughout Galalar North and Galalar West, especially completing regularly - spaced cross -dune drilling. • Complete drilling along the western flank of Galalar Main Dune, to better define its limit. • Review the model and especially isolated drillhole and assay anomalies, including high Fe_2O_3 zones. • Ensure Sampling and Assaying Procedures are continuously reviewed and improved. Maintain systematic application of assay checking. • Conduct density "certified" bulk density measurements. • Verify topsoil thickness across the resource area, given the variation in vegetation density from west to east and from southeast to northwest throughout the Resource Area.

Section 2 Estimation and Reporting of Mineral Resources

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 Diatreme Resources Limited 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.
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.*	• The Competent Person completed and recorded a site visit of the Galalar Silica Sand Project on 29th of July 2021. The visit provided an understanding of the dune sand formation, the general geology, geography and logistics. The visit confirmed the completed exploration work across the Resource Area. • The Competent Person has previously visited Cape Flattery/Cape Bedford and has experience of the dunefield complex.

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Criteria	JORC Code explanation	Commentary

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 Galalar Silica Sand Project 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 Galalar 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 0.3m below surface topography.
		  • Bottom surface – a gridded surface based on drillhole depths and geological interpreted boundary points.
		  • 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.*	• Within the Galalar Dune System, there are some relative subdivisions based on location, dune size and topography. This includes:
		  • Galalar West
		  • Galalar Main
		  • Galalar East
		  • Galalar North *
		* Galalar North extends outside the northern Mining Lease Boundary to an extensive area known as **Galalar Extended**.
		• The extent and variability of the Mineral Resource is expressed in terms of the full Resource Area
		  • **Max Length (along strike):** 4.3 km

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Criteria	JORC Code explanation	Commentary
		• **Max Width:** 1.7km • **Area:** The Mineral Resource covers an area of approximately 386ha. • **Average Depth:** The average thickness of the total resource within the Resource Area is 15.5m. • **Top of Resource:** The top of the resource corresponds to the topography ranging from 4.5mRL to 75mRL. • **Bottom of Resource:** The base of the resource corresponds to basement/water table ranging from 0.5mRL to 68.5mRL.
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 (e.g. 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 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.*	• Sample intervals have been collected at 1m and 3m through the various drilling program. Normalising of the 3m intervals of the assay data to 1m was undertaken to ensure there was no sample bias based on the sample interval length. • 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 r 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. • Parent block sizing was chosen as 10mE x 10mN x 1mRL which was then sub-blocked to 1m E x 1m N x 1m RL. • The Ordinary Kriging (OK) method was used to estimate the grades and populate the block model. • Each block within the blank block model was assigned values for SiO_2, Fe_2O_3, TiO_2, LOI and Al_2O_3. • Cross-sections throughout the block model were compared with the same sections through the drillhole data to showing that the modelling completed was indicative of the input data and the mineralisation. • Multiple cross section iterations were used to further define and constrain the model where data was minimal. • Finally, swath plots were used to validate the interpolation technique to ensure accuracy. Swath plots compared the drillhole and block model with SiO_2 and Fe_2O_3 grades which showed sufficient spatial correlation between both modelled estimates and input drillhole grades. • The Inverse Distance Weighting (IDW) method was used to check the model and yielded similar results.

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Criteria	JORC Code explanation	Commentary
Moisture	• *Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	• Moisture content testing has been conducted on eight (8) holes which were logged in 1m intervals with samples sealed within plastic bags and then placed in canvas sample bags and were sent to ALS Brisbane.
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 Resource Area. • Only in a few rare drillholes did the resource intervals include intermediate sub-marginal silica grades, but these intervals were restricted to several vertical meters or less. Here the grades were >96% SiO_2 in any case. Consideration was given to the XRF method very marginally under-reporting silica grade and possibly slightly overestimating iron (Fe_2O_3) grade, however no adjustments were made. • The surface to one (1) metre interval consistently returned a <98.5% silica assay and retuned higher than normal LOI. This logged interval included a thin average 0.3m topsoil and recorded organic material which caused minor contamination. This one (1) metre interval was adjusted by adopting the succeeding one metre assay grade. A topsoil layer from surface (0.0m to 0.3m) was excluded from the Mineral Resource Estimate. • A silica grade cut-off of 98.5% SiO_2 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 directly from the face by a Wheel Loader which will load a feeder unit with trommel. Material will then be mixed with water to a slurry and pumped through pipes 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 0.3m 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.

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Criteria	JORC Code explanation	Commentary
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.*	• A number of metallurgical test programs have been undertaken on the Galalar Silica Sand Project. These tests support the potential metallurgical amenability for silica mining and processing, yielding a high purity, low iron silica product(s). • In March 2018, initial metallurgical samples were submitted to IHC Robbins for characterization test work (screening, de-sliming, sizing, HLS and XRF analysis) and wet tabling (two stage). • In August 2018, IHC Robbins completed a bulk (1.8t) laboratory sample to determine viability of product through a one stage of Mineral Technologies MG12 spiral, which yielded 99.9% SiO_2 at 88% recovery. • In December 2018, (CNBM) Bengbu Design & Research Institute for Glass Industry Co., Ltd completed bulk (0.35t) laboratory sample to determine the viability of the product as high value glass product which resulted in 78% recovery of a >99% SiO_2 raw sample to 99.9% SiO_2. • In November 2019, Qinfeng Mining Co Ltd (QMCL) conducted initial small-scale evaluations that demonstrated the suitability of some of the raw sand to be processed by additional chemical treatment to produce an upgraded, low iron high value product. • Mineral Technologies (MT), a sand industry specialist, undertook final metallurgical test work for the Galalar Silica Project's pre-feasibility study (PFS) with work completed in August 2021. The testing program used the bulk samples obtained in the October 2020 drilling program. Two variability samples from other areas within the first 15 years' mining were also processed to finalise the process flowsheet.
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.*	• Due to the high-grade nature of the deposit, it is expected that there will be ~20% tailings produced through processing and thus minimal disposal. • There is a small offset applied on either side of Alligator Creek which bisects Galalar East and Galalar West as well as Deep Creek located east of Galalar East. • Some potential environmentally sensitive areas 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.
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.*	• Seventy-eight (78) bulk density measurements have been undertaken on site using a Dormer Push Tube. The sampling procedure is considered industry standard for this type of field assessment • A material density of **1.6 t/m^3** was used for the Mineral Resource Estimate. However, the density measurements showed variable results with a range of 1.42 t/m^3 to 1.75 t/m^3.

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Criteria	JORC Code explanation	Commentary
	• *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	

Classification	• *The basis for the classification of the Mineral Resources into varying confidence categories.*
	• *Whether appropriate account has been taken of all relevant factors (i.e., 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 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 (150m-250m) ending in basement/water table.
		  • **Inferred Mineral Resource:** Areas with drillholes at a scout level spacing (250m-400m).
		• The result accurately reflects the Competent Person's view of the deposit.

Audits or reviews	• *The results of any audits or reviews of Mineral Resource estimates.*	• A 3rd party review was conducted on the July 2021 Mineral Resource Estimate Report by Resolve Mining Solutions who reported "no fatal flaws" based on the elements reviewed. • Previous Mineral Resource Estimates have been completed by separate Competent Persons and reviewed internally by Ausrocks Pty Ltd.
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 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 should be compared with production data, where available.*	• 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 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

Section 4 Estimation and Reporting of Ore Reserves

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	• *Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* • *Clear statement as to whether the Mineral Resources are reported*	• The Mineral Resource Estimate used as a basis for the conversion to an Ore Reserve was developed by Chris Ainslie & Brice Mutton of Ausrocks Pty Ltd as part of the 'Galalar Silica Sand Project – Measured, Indicated and Inferred

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	additional to, or inclusive of, the Ore Reserves.	Upgraded Mineral Resource Estimate – 03 September 2021. The block model was developed in Micromine 2021 and titled 'GSSP_BM PFS_08_2021'. • Only ~43% of the Measured and Indicated Mineral Resources were converted to Ore Reserves. • Factors affecting the conversion of Resources to Reserves include ecological constraints, groundwater table, zones of elevated Fe2O3 as well as proximity to ML Boundary, roads and watercourses. • The PFS includes an additional 12.2% of Resources within the 23.5 year mine life. These Resources may include areas outside the Mining Lease, Measured, Indicated or Inferred Resources. • The Mineral Resources reported above are inclusive of the Ore Reserves.
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.*	• The Competent Persons for Exploration Results & Mineral Resources, Neil Forbes & Brice Mutton have completed site visits to the Galalar Project. • The visit confirmed the topography, vegetation, groundwater and other mining assumptions used in the PFS. • No site visit has a been undertaken by the competent person for Ore Reserves at the time of release due to Covid 19 restrictions.
Study status	• *The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.* • *The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.*	• Diatreme Resources has completed a Pre-Feasibility Study (PFS) for the Galalar Silica Sand Project. This Ore Reserve was completed in conjunction with the PFS and is therefore reported concurrently.
Cut-off parameters	• *The basis of the 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 Resource Area. • Only in a few rare drillholes did the resource intervals include intermediate sub-marginal silica grades, but these intervals were restricted to several vertical meters or less. Here the grades were >96% SiO_2 in any case. Consideration was given to the XRF method very marginally under-reporting silica grade and possibly slightly overestimating iron (Fe_2O_3) grade, however no

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		adjustments were made. • The surface to one (1) metre interval consistently returned a <98.5% silica assay and retuned higher than normal LOI. This logged interval included a thin average 0.3m topsoil and recorded organic material which caused minor contamination. This one (1) metre interval was adjusted by adopting the succeeding one metre assay grade. A topsoil layer from surface (0.0m to 0.3m) was excluded from the Mineral Resource Estimate. It is assumed this material will be utilised for rehabilitation. • A silica grade cut-off of 98.5% SiO_2 is robust and was applied as the cut-off grade for the resource modelling and Mineral Resource Estimate, for all reporting levels. • When applying the 98.5% SiO_2 cut-off grade, several small zones of waste were modelled within the main body of the Reserve where SiO_2 was below cut-off. This material is anticipated to be selectively mined and dumped as waste and is excluded from the saleable product. The total volume of waste within the Pit Shell is 37,176t, which represents approximately 0.1% of the Ore Reserve.
Mining *factors* or assumptions	The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).	
	• *The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.*	• An open cut mining method was selected due to the proximity of the deposit to the surface, lack of overburden and proximity of water table. This method is utilized for similar mining operations nearby. The method selected includes dozer push, loader excavation and then slurry pumping to the processing plant. While several options are feasible for mining the Ore including truck and shovel and conveyors, the slurry method was chosen due to its benefits with being flexible and scalable for productivity.
	• *The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling.*	• Geotechnical parameters are selected based on experience in similar mining environments, the site has limited highwalls and relatively low excavation depths which limits the geotechnical risk of the operations. A 30 degree batter angle has been selected which is more conservative than the sand angle of repose. • No benches are required due to the low batter angle and relatively low depth of excavation. • Grade control at a 50x50m grid has been assumed pre-mining to assist with optimisation.
	• *The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate).*	• Due to the lack of overburden, pit optimisation was limited to the practical mining area through mining parameters rather than strip ratio.
	• *The mining dilution factors used.*	• A mining dilution factor of 0% has been used. This assumes that removal of

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		topsoil is well managed resulting in minimal dilution. The deposit does not exhibit a typical overburden or host rock, with the surrounding material generally high silica sand. The basement material is generally also high in silica (>90%) and therefore dilution is anticipated to negligible for the operation.
	• *The mining recovery factors used.*	• 100% mining recovery is assumed due to the simplistic mining method where recovery is well managed through survey.
	• *Any minimum mining widths used.*	• No minimum mining width is used due to the flexibility in the mining method, relatively low mining depth and vast footprint of the resource areas. The pit design includes two areas with a width of ~150m which is reasonable given the flexibility of the mining method.
	• *The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion.*	• No Inferred Resources are utilised to support the Reserve Estimate, whilst Inferred Resources are present in the satellite areas outside the Reserve, these have not been factored into the mining studies.
	• *The infrastructure requirements of the selected mining methods.*	• No fixed infrastructure is required to facilitate the mining method. All equipment is mobile and the flexibility of the method allows plant to be moved around site frequently to minimise tramming distances.
Metallurgical factors or assumptions	• *The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.* • *Whether the metallurgical process is well-tested technology or novel in nature.* • *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.* • *Any assumptions or allowances made for deleterious elements.* • *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.* • *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?*	• Mineral Technologies (MT) were engaged to prepare a Definitive Feasibility Study to identify the preferred equipment, operating and technical requirements to achieve a suitable silica sand processing facility for the GSSP in September 2021. The proposed metallurgical process is well developed in the silica sand industry and uses mainly off-the-shelf plant and components that are tried and tested at sites with similar operating parameters. • The selected plan includes a Dry Mining Screen Unit (DMSU) and a Wet Concentrator Plant (WCP). The WCP includes a Lyons Feed Control Unit Surge Bin, Spiral Separation, Attritioner, Up Current Classifier, Low & Wet High Intensity Magnetic Separators and a Thickener. The plant is capable of 150t/h with provisions to upgrade the plan to 220t/h at a later stage. • Metallurgical testing conducted to date is sufficient to support the PFS study and further test work is likely to be commissioned as the mine progresses closer to the approval stages. • Bulk samples representative of the first 5 years mining were used in the latest metallurgical testing. Additional bulk samples from around year 15 have previously been used for pilot scale testing. • Recovery rates of ~69% to 94% were observed during metallurgical testing. A recovery rate of 80% has been assumed for the PFS based on metallurgical testing.

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		• The main contaminant Fe_2O_3 has been assessed through metallurgical testing and grades consistent with the first 10 years mine schedule have been used in the bulk sample trials. Higher Fe_2O_3 occurs in years 10 onwards but variability testing indicates this material will still produce a high grade product, but requires optimising of the processing method.
Environmen-tal	• *The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.*	• An Environmental Impact Statement has been progressed to a satisfactory level for the project and preliminary guidance is that the approvals process is progressing well. • The operation has limited high risk environmental factors due to its benign nature and lack of chemical use for treatment.
Infrastructure	• *The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.*	• Studies have been undertaken to determine the feasibility of the barge loading facility which is the most critical infrastructure for the transport process. • Labour, accommodation and other services have been assessed and are available locally, sufficient community engagement has been completed to support this process.
Costs	• *The derivation of, or assumptions made, regarding projected capital costs in the study.* • *The methodology used to estimate operating costs.* • *Allowances made for the content of deleterious elements.* • *The source of exchange rates used in the study.* • *Derivation of transportation charges.* • *The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.* • *The allowances made for royalties payable, both Government and private.*	• Capital and operating cost items have been estimated using a mixture of fee proposals from suppliers, benchmarking similar operations and industry knowledge. • Capital Cost Estimates are -20% to +30% • A 13% Capital Cost Contingency has been factored. • Operating Cost Estimates are -15% to +25% • A 0% Operating Cost Contingency has been factored. • Provision has been made for escalation of future operating and capital costs in line with reasonable market expectations. • Shipping and transshipping costs have been derived from vendor quotes. • All likely royalties including Government and Hopevale Congress have been considered.
Revenue factors	• *The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* • *The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.*	• Head grade has been determined by mine scheduling categorised annually. • Silica Sand product pricing has been based on market assessment, discussion with potential offtake partners and comparable industry data. • Prices are estimate FOB and include barge loading and transhipping costs calculated by fee proposals from shipping contractors.
Market assessment	• *The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the*	• A Marketing study by Diatreme has assessed the likely sale price, consumption and competition with other suppliers in the industry.

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	future. • *A customer and competitor analysis along with the identification of likely market windows for the product.* • *Price and volume forecasts and the basis for these forecasts.* • *For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.*	• Reputable market bodies have indicated the demand for silica sand is increasing and that the sand produced at Galalar will be readily accepted by the market. • Price and volume forecasts are considered relatively conservative. Final product price of A$81/t (FOB Equivalent) is used for PFS. • Production of 1.65Mt/a results in 1.32Mt/a product sales. This volume forecast is conservative as it represents ~<2% of the global market for silica sand across the glass industry, foundry, hydraulic fracturing, filtration, abrasives and others. • Silica sand specifications have been researched and very high grade product is anticipated to be marketed by Diatreme incl 99.90% SiO_2, 115ppm Fe_2O_3, 450ppm Al_2O_3 & 200ppm TiO_2.
Economic	• *The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.* • *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*	• An economic analysis has been undertaken by Diatreme including inputs from the various project team members. • Blackbird and Diatreme have completed a comprehensive economic analysis of the GSSP with the following key outcomes; • Post Tax, ungeared NPV8 $358M • Post Tax, ungeared IRR 66%, • Payback period 1.4 years • CaPex $57.3M • CaPex Contingency (13%) $7.8M • Sustaining Capital LOM $35M • LOMC1 costs FOB $33.9/t • C1 Costs $59.1/t • LOM OpEx $1.051B • LOM OpEx Shipping $783M • LOM Net Revenue of $2.493B • Mineral Resources 75Mt • Ore Reserve (Maiden) 32Mt • Ave Annual Mined 1.59Mt • Ave Annual Processed 1.26Mt

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		• 23.5 year LOM (39.1Mt Mined & 31Mt Product) • Recovery 80% • Ore Grade SiO2 99.2% • Ore Grade Fe2O3 800ppm • Product Grade SiO2 99.9% • Product Grade Fe2O3 105-110ppm • Product Grade TiO2 180ppm • Product Grade Al2O3 420ppm
Social	• *The status of agreements with key stakeholders and matters leading to social licence to operate.*	• The EIS has considered Social Impacts and the project holds a number of agreements with key stakeholders including Hopevale Congress. • It is anticipated that Diatreme will be able to progress these agreements to final completion in a reasonable timeframe.
Other	• *To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:* • *Any identified material naturally occurring risks.* • *The status of material legal agreements and marketing arrangements.* • *The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	• Risk Assessments have been completed for a number of key areas • Diatreme has signed a number of MOU's with Chinese buyers concerning its Galalar Silica Sand Product, agreements are expected to progress as the mine nears approval stages. • Mining Lease approvals for the GSSP have been submitted for QLD Departmental assessment. Diatreme has reasonable grounds that approval for these Mining Leases will be granted within the timeframes nominated in the PFS.
Classification	• *The basis for the classification of the Ore Reserves into varying confidence categories.* • *Whether the result appropriately reflects the Competent Person's view of the deposit.* • *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	• The Ore Reserve has been classified 100% as Probable Ore Reserves. • Ore Reserves were derived from ~73% Measured Resources and ~27% Indicated Mineral Resources. The first 5 years of mine life are derived from ~88% Measured Resources and ~12% Indicated Mineral Resources.
Audits or reviews	• *The results of any audits or reviews of Ore Reserve estimates.*	• Ore Reserve estimates have been reviewed internally by Diatreme. • No external audits of Ore Reserve estimates have been conducted at this stage.

Discussion of relative accuracy/ confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve 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 reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which 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.* • *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage.* • *It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	• The Ore Reserve is based on a PFS which has been completed to a level of detail expected for the project at its current stage. Whilst a global accuracy for the Ore Reserve cannot be stated, CAPEX estimates were completed to -20% to +30% accuracy and OPEX were completed to -15% to +25% accuracy. • Further work is required to allow geostatistical analysis to be used for estimation of relevant confidence intervals for the Ore Reserve. • Key risks to the Ore Reserve are the metallurgical recoveries, product price, shipping costs and transshipment methodology. The competent person believes that appropriate level of detail has been provided for these factors and that the assumptions made are of a conservative nature.

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