ASX ANNOUNCEMENT

9 September 2019

Galalar scoping study emphasises high return potential

- **Scoping study for Diatreme's Galalar Silica Project, Far North Queensland, confirms project capable of becoming a significant near-term, low-cost and premium quality silica producer**
- **Mining Lease in a pre-lodgement process with Queensland regulatory agencies and preparation of external independent environmental surveys is currently underway**
- **Targeting production of high purity silica sand (with low iron) required for production of solar panels and ultra –clear glass products**
- **Further improvements likely for study to enhance economic returns, concerning export logistics , potential for a further "ultra-low iron" silica export product and exploration areas identified to potentially add to existing resource base**
- **Offtake discussions continuing**
- **Scoping Study and its financial results attached to ASX announcement**

Emerging silica sands explorer and developer, Diatreme Resources Limited (ASX:DRX), announced today a scoping study for its Galalar Silica Project in Far North Queensland, highlighting the project's potential to become a significant near-term, low-cost and premium-quality silica producer for fast growing Asian markets.

To be developed in partnership with the traditional owners, Hopevale Congress (12.5% Project interest), the new mine located 200km north of Cairns has the potential to generate high-value jobs for the local community, with a focus on maximising local employment and supplier opportunities. Estimated employment is around 30 to 40 jobs in the construction phase and around 60 (employees and contractors) in production, for an operation with a projected mine life of 15 years.

Cautionary Statement

The Scoping Study referred to in this announcement has been undertaken as part of staged, next step process to determine final pathways to a feasibility study based on an increased understanding of project requirements. It is a preliminary technical and economic study of the potential viability of the Galalar Silica Project.

Further exploration and evaluation work and appropriate studies are still required before the Company will be in a position to complete a feasibility study, to estimate any Ore Reserve or to provide any assurance of a final economic development case.

Of the Mineral Resource on which the Production Target is based, 71% is in the Indicated Mineral Resource category (Table 1). The Company has concluded given the level of Indicated Resource that it has reasonable grounds for disclosing a Production Target.

There is a low level of geological confidence associated with Inferred Mineral Resources (29% of Total Mineral Resource Estimate) and there is no certainty that further exploration work will result in the determination of additional Indicated Mineral Resources or that the Production Target itself will be realised. The level of accuracy within this project scoping study includes the uncertainty associated with incorporating Inferred Resources. The stated Production Target is based on the Company's current expectations of future results or events and should not be relied upon by investors when making investment decisions. Further evaluation work and appropriate studies are required to establish sufficient confidence that this target will be met.

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

To achieve the possible mine development indicated in the Scoping Study, additional funding (to that required to establish the project) of at least approximately AU$25 million is likely be required. Investors should note that there is no certainty that the project will generate sufficient operating surpluses to fund this or that the Company will be able to raise such funding when needed. However, the Company has concluded it has a reasonable basis for providing the forward-looking statements included in this announcement and believes that it has a reasonable basis to expect it will be able to fund the development of the project. It is also possible that such funding may only be available on terms that may be dilutive to, or otherwise affect the value of the Company's existing shares.

The Company could also pursue other 'value realisation' strategies to provide alternative funding options. These may include a sale, a partial sale or a change in the terms of the present project joint venture. If it does, this could materially reduce the Company's proportionate ownership of the overall project.

The Scoping Study is a project level study and consequently the sources, forms and costs of the capital required to develop the mine have not been accounted for in calculating the financial returns demonstrated by the Scoping Study. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the Scoping Study.

Scoping Study Outcomes

Significantly, the study's financial analysis demonstrates Galalar has the potential to be a highly profitable operation, with an estimated pre-tax nominal NPV of $231 million, an IRR of 150% and estimated capital payback within a year (8 months). Total estimated development capex is $24.4m, with annual operating costs estimated at $42.0m based on the currently planned logistics program that involves trucking product from the mine site to an area 63km away, for transhipment outside Cooktown.

In addition, Diatreme has identified potential improvements that offer further enhancements to project economics, including developing a purpose-built barge ramp closer to the mine site (approx. 4 kilometers away from proposed ML area) at a location called Nob Point (subject to various Queensland Government approvals), which could offer an estimated further AU$20-25 per tonne in cost savings on current scoping study operating costs.

A further improvement could come from developing as a secondary silica product stream an "ultra-low iron" silica sand sub 50ppm Fe203 product, which is currently trading at a significant price multiple to the sub 100ppm Fe203 product. This option is currently being evaluated by a China based industry specialist and at an independent laboratory in China.

Note: The study results in Table 1. Below, should be read in the context of the "Material assumptions used in Scoping Study Outcomes" numbered below (1-15) and the cautionary statements set out above on pages 2 and 3 of this release.

Table 1 – Galalar Silica Project – Key Scoping Study Outcomes

TECHNICAL PARAMETERS	
ANNUAL MINING	950,000 TONNES
RECOVERY RATE	79%
ANNUAL PRODUCTION	750,000 TONNES
LIFE OF MINE (INITIAL)	15 YEARS
PAYBACK PERIOD	8 MONTHS

FINANCIAL PARAMETERS	
COMMODITY PRICE [12] (FOB)	US$75 (A$107) PER TONNE
CASH COST [3]	A$58.00 PER TONNE
START UP CAPITAL [4]	A$24.4 MILLION
LOM SUSTAINING CAPITAL	A$3.7 MILLION
NPV (PRE-TAX NOMINAL) [5]	A$231 MILLION
IRR (PRE-TAX NOMINAL) [7]	150%

Material assumptions used in Scoping Study Outcomes

1. Exchange rate assumption is AUD/USD FX 0.70.
2. Commodity Price is FOB – Assumes payment on delivery at vessel in Cooktown Port, buyer responsible for shipment costs.
3. Cash costs represent all direct cash operating costs divided by the amount of silica produced. Direct cash operating costs include all mining, processing,transport and transhipment costs.
4. Start-up capital costs represent pre-production requirements exclusive of working capital and sustaining capital.
5. NPV has been discounted using a discount rate of 10% and is a pre-tax nominal calculation. NPV and IRR are discounted from ramp up of start-up capital.

6. Contingencies of 25% on capital costs and 10% on operating costs have been built into the financial model.
7. Financial model is pre-tax based, as assumptions regarding level of debt (gearing levels) or associated financing costs are undefined within this level of study and the model assumes the project is fully equity funded.
8. Commodity price assumption of USD$75 per tonne FOB Cooktown Port for "low iron" silica sand suitable for photovoltaic manufacture requirements. However, no binding offtake agreements are in place at this time.
9. Revenue is constant based on current prices and ignores any projected growth in prices over time.
10. The Galalar Project has a current total Mineral Resource Estimate of 30.2 Mt (Cut-Off- 99% Sio2) including an Indicated Resource of 21.50Mt (71% Indicated, 29% Inferred) (refer ASX announcement 14 May 2019).
11. Recoveries of 79% to saleable product from primary feed material.
12. The production target is 15 years of mining at a rate of 950,000 tonnes per year for a total 14.25 million tonnes of sand mined, which is **66% of the Indicated Mineral Resource (21.5 million tonnes).**
13. **100% of the proposed 15 year mining activity falls within the Indicated Mineral Resource category.**
14. Financial model assumes Qld Government royalties at A$0.90 per tonne
15. **Note: This level of scoping study typically has degree of accuracy of plus or minus 30-35%.**

Diatreme's CEO, Neil McIntyre said the study results demonstrated Galalar's genuine potential to make a major contribution to Far North Queensland's economic future.

"These results are tremendous, highlighting the opportunity that exists at Galalar to create a long-lasting silica sand mine that creates new jobs and other economic benefits for the whole community, in partnership with the traditional owners," he said.

"Having recently signed a MOU for offtake from the project (refer ASX announcement 16 July 2019), there is already significant market interest in the product given the demand growth from Asia's rapidly expanding solar PV market. With added opportunities to enhance these already excellent financial outcomes, we look forward to advancing this project towards near-term development and creating an environmentally friendly and sustainable operation."

The scoping study's release follows recent meetings in Cairns that showed strong regional support for the new mine. Key stakeholders represented included Hopevale Congress, together with representatives from Queensland Government agencies, the Office of Indigenous Affairs, the Department of the Prime Minister and Cabinet, Northern Australia Infrastructure Fund (NAIF), Hope Vale Aboriginal Shire Council and Cook Shire Council.

Earlier last month, Diatreme announced the signing of a non-binding MOU with Fengsha Group, China's largest processor and supplier of photovoltaic (solar) and specialty high end silica sand, for the supply of up to 750,000 tonnes per annum of silica product. The MOU's terms included Fengsha providing product development technical support, market access and logistics and to examine the potential for direct project investment.

Financial analysis of the project economics is based on achieving product pricing for high grade "low iron" silica product suitable for the manufacture of photovoltaic glass panels of USD$75 per tonne, delivered FOB Cooktown Port (AUD: USD exchange rate of 0.70).

Galalar Silica – Premium Quality Product – Price Expectations

The scoping study silica product price assumption of USD$75 per metric tonne is based on the following;

- Current project product testing to date and expectations on final product quality that clearly exceed market quality requirements (refer specifications below)

- Gathered market intelligence from various silica product offtakers and China based glass manufacturers whose product price expectation for the " low iron" silica sand product are in the range of USD$65-$85 per tonne (FOB - Cooktown) dependent on final volumes delivered , contractual commercial negotiations and final delivered product specifications.

PARAMETER	CHINA REQUIRED SPECIFICATION	GALALAR EXPECTED QUALITY
Particle size distribution	109-700 microns (24-140 mesh)	109-700 microns 98% in range
SiO2	>99.5%	99.7%
Fe2O3	<100ppm	85ppm
TiO2	<400ppm	140ppm
Al2O3	<1000ppm	500ppm

Table 2. *Photovoltaic glass specification (China) and Galalar comparison*

Annual operating costs are based on the currently planned logistics program trucking product from mine site to a laydown area (63 km away) to be based at the Marton boat ramp on the Endeavour River west of Cooktown, followed by transshipping product along the river (10 km) for transshipment at a roadstead (subject to approval) just outside the Cooktown designated port area.

The Galalar project has a current total Mineral Resource Estimate of 30.2 Mt (at a cut of 99% Sio2) including an Indicated Resource of 21.50Mt (71% Indicated, 29% Inferred) (refer ASX announcement 14 May 2019). The study predicts an average mine production rate of 138 tph (950,000tpa) and final production rate of 110tph (750,000tpa), with an estimated recovery rate of 79% from raw (sand) product feed.

A mining lease application for project is currently in a pre-lodgment process with Queensland regulatory agencies in anticipation of formal submission. Preparation of external independent environmental surveys to be used for that submission is currently underway (wet season study completed in January 2019) with the dry season studies anticipated to be completed over the coming weeks.

Given the highly positive results from the scoping study, the Company is moving forward actively with next step environmental studies and submissions, and advancing the permitting and approvals processes.

The Company has also identified a further three (3) potentially significant project enhancement options to the existing study which it intends to pursue actively to further potentially improve the project's fundamental economic returns, comprising:

(1) Logistics and Infrastructure

- **Development of a purpose built barge ramp facility closer to mine site**.

The Company has identified a site some 3km from the mine site at Nob Point. Recent bathymetric surveys undertaken (checking water depths) indicate this area would be suitable for the establishment of a low intrusion barge ramp loading facility. This option will require Queensland Government consent, specifically an exemption from the Sustainable Ports Development Act (2012).

Key project stakeholders Hopevale Congress are supporting the Company to actively pursue this option through pursuing engagement with the Queensland Government and relevant line ministers and see the facility (jointly used) as an important piece of community access infrastructure.

The use of a purpose built facility close to mine site would save an estimated $20-25/t on operating costs (significantly less transport and transhipment costs). The Company plans to actively pursue this option whilst running in parallel with the current scoping study development scenario.

(2) Additional high-value silica “ultra-low iron” export product

The Company has currently underway a further testing program at an independent Chinese laboratory aimed at determining if a further “ultra-low iron” Sub 50ppm Fe203 product can be produced from the project within its 750,000 tonne product export program.

If successful, this may result in a portion of the exported product being further processed in China under a suitably negotiated tolling or joint venture arrangement.

Current pricing for this “ultra-low iron” silica product, from gathered market intelligence and interactions with potential end users is at a significant premium to the “low-iron” product, subject to final determined specifications and offtake agreements. Whilst this market is much smaller than the photovoltaic silica market in size, it has the potential to increase significantly the average price realised for exported product if testing proves successful and a suitable further processing relationship in China can be established.

(3) Additional Resource Potential

Diatreme has identified exploration targets relatively close (starting within 1 kms) of the Galalar Mineral Resource with the potential for exploitation using the currently planned product logistics system through Cooktown port for ship loading.

These areas (refer **Figure 3.**) are Elim Road North (exploration target 100m -1B Tonnes) and Elim Road South (exploration target 20m – 100mt). These areas will be prioritised for resource drilling and exploration with a view to adding potential further silica tonnage to the existing known mineral resource and potentially additional mine life extensions.

Cautionary Statement: The exploration target potential grade and quantity is conceptual in nature, there has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

Note – Refer ASX release dated 20th June 2019 “ **Boost for Galalar with sampling of regional exploration targets confirming continuity of high silica grades”** , for further information on both areas and regional exploration targets within the existing tenement.

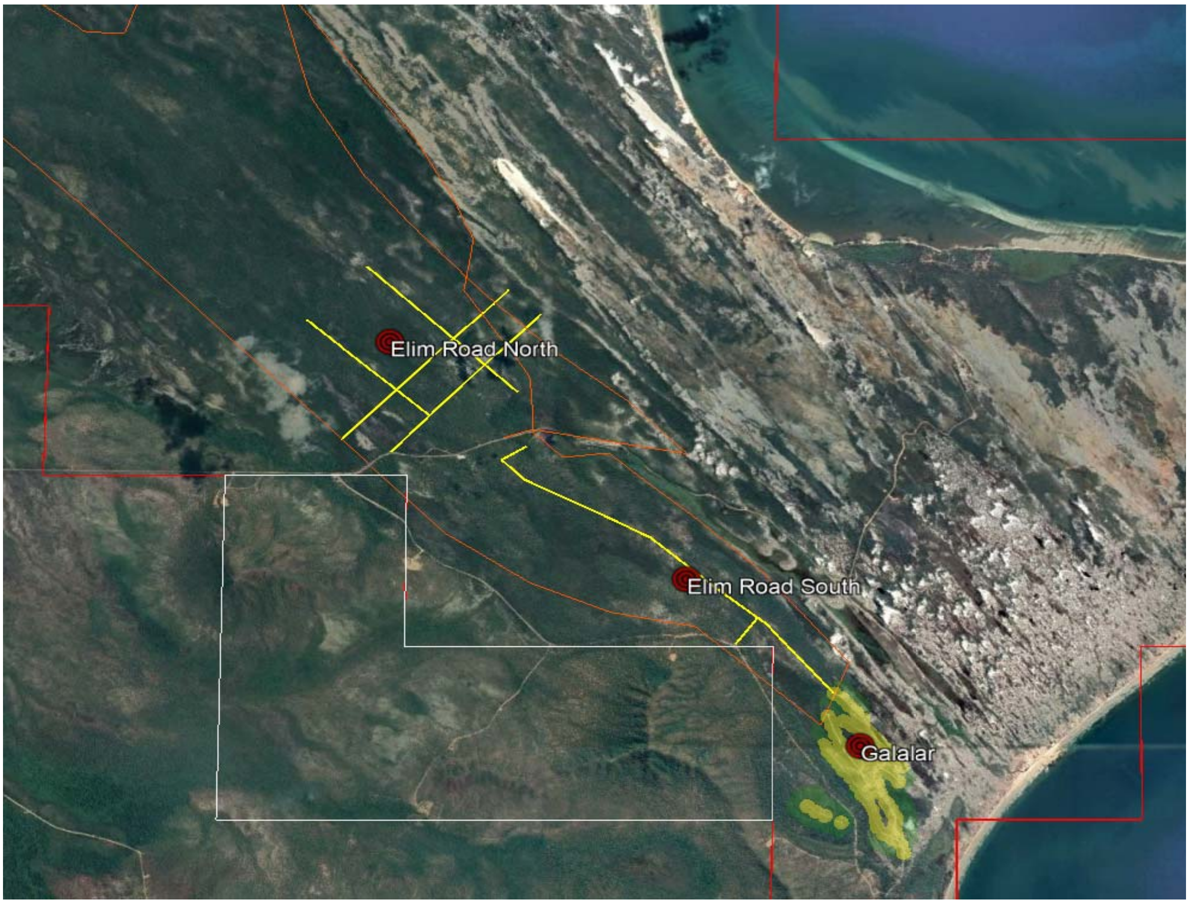

Figure 3. *Elim Road North & Elim Road South showing future exploration target planned drill lines.*

The Company will provide further commercial scoping and feasibility study updates regarding these project enhancement initiatives as these options are further pursued and progress.

Please refer to attached scoping study for further details.

Neil McIntyre
Chief Executive Officer

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Chairman

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Competent Person Statement

The information in this report that relates to Exploration Results and Exploration Targets from the Galalar Silica 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).

Mr. Mackenzie-Forbes has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr. 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 is based on information compiled by Brice Mutton from Ausrocks Pty Ltd who has significant experience in Industrial Minerals and Quarry Resource assessments. Brice 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).

Brice 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 corresponding JORC 2012 Table 1 is attached to this report.

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.

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DIATREME Resources

AUSTRALIAN SANDS. UNIVERSAL DEMAND.

GALALAR SILICA SAND PROJECT

SCOPING STUDY

SEPTEMBER 2019

ASX:DRX

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Galalar Silica Sand Project

Objectives

The project objectives are:

- To become a globally recognised supplier of high purity silica sand to world high clarity glass markets.
- To continue exploration near the Galalar mineral resource to produce sufficient data that will enable estimation of a Proved Ore Reserve suitable for establishment of an efficient silica sand mining operation.
- To define at least 20 million tonnes (mt) of sand reserves for a mine life in excess of 20 years.
- To establish an efficient, safe and environmentally acceptable mining operation through co-operation with Hope Vale Congress and Government regulators.
- To establish an efficient, safe and environmentally acceptable system for transporting the product from the Galalar project site to international customers.
- To responsibly expand the business to meet the world demand for high purity silica sand required for the production of solar panels and other ultra-clear glass products.
- To be recognised as a valuable contributor to the local community by employing locally and supporting local businesses.

Key Strategic Benefits

- Major new long-life business for Far North Queensland that will commence as a medium scale silica operation with potential to expand and grow as the markets and local infrastructure are developed.
- New infrastructure for the Hope Vale and Cooktown areas.
- Increased employment and business activity for the Hope Vale and Cooktown region.
- Not a fly-in fly-out operation. Employees to live locally and travel daily to work.
- Royalties for Hope Vale Congress and Qld State Government.
- New business opportunities for local contractors and service industries.

Alternatives Investigated

Areas to the north and close to the existing Cape Flattery Silica Mines (CFSM) were investigated as potential sites for silica sand and heavy mineral exploration drilling.

There are no existing land access routes to these areas and the only practical access route for exploration and operational logistics is by barge through the Cape Flattery Port and across land held under mining tenements held by CFSM.

Diatreme was unable to negotiate an arrangement with CFSM for access across its tenements and subsequently focussed on the Cape Bedford area to the south.

Existing roads from Hope Vale to the Cape Bedford area are used for access to the southern exploration targets and the Hope Vale Congress contractor (Nambal) was engaged to construct tracks for exploration activities.

Location

The Galalar project is located around 20km north of the port of Cooktown and 20km east of the town of Hope Vale (Figure 1). The corporate office of Diatreme Resources Limited is located in Brisbane, the capital city of Queensland.

The project site is accessible by public roads which are currently maintained by the Queensland State Government and the Hope Vale Aboriginal Shire Council. Galalar lies within an extensive sand dune system which also hosts the Mitsubishi-owned Cape Flattery Silica Mine.

Figure 1: Project location map

Tenement

Diatreme holds an Exploration Permit for Minerals (EPM17795) which covers the majority of the quaternary sand dune formations from Cape Bedford in the south to Lookout Point in the north and surrounds the tenements of the Cape Flattery Silica Mine (Figure 2).

EPM17795 spans approximately 55km north to south and 25km east to west.

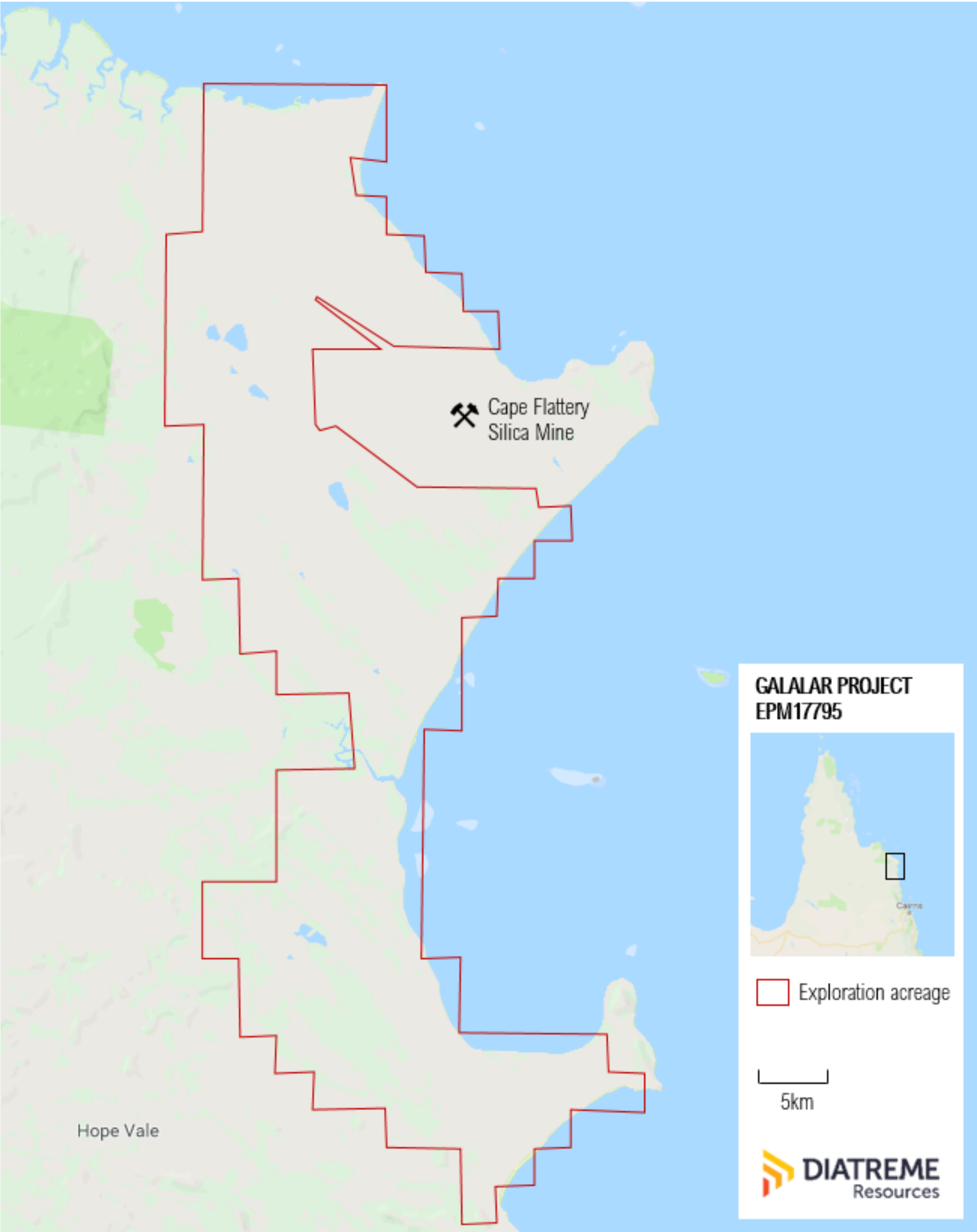


Figure 2: Exploration tenement

The Galalar project site is located at the southern end of EPM17795. Diatreme applied for EPM17795 on 22/08/2008 and it was granted on 22/06/2016 for a duration of 5 years (expiring 21/06/2021) targeting high grade silica sand and heavy minerals. EPM17795 spans across 167 sub-blocks and the original EPM licence conditions require this area to be reduced to 100 sub-blocks during 2019 and to 50 sub-blocks during 2021.

On 30/07/2019, following a submission from Diatreme, the regulator, Queensland Department of Natural Resources, Mines and Energy (Qld DNRME) amended the original licence terms to allow the Company to relinquish only 20 sub-blocks during years 4 & 5, retaining 147 sub-blocks within the EPM17795 area.

Diatreme has engaged AusRocks Pty Ltd to assist with an application to Qld DNRME for a mining lease for the Galalar project. The area of the mining lease is being finalised and will ideally cover the entire area of the Galalar mineral resource, the potential water bore sites, and provide access from a public road.

Native Title

Diatreme executed a Conduct and Compensation Agreement in January 2017 and a Cultural Heritage Agreement in June 2017 with the traditional owners, Hope Vale Congress. A cultural heritage survey over the Nob Point to Elim Beach area in the southern part of EPM17795 was completed in August 2017 prior to commencing ground exploration activities. Exploration activities require a representative of the traditional owners to be present during ground disturbing activities.

Hope Vale Congress holds a 12.50% interest in the Galalar project as the representative body for the traditional owners of the area where the project and the exploration tenement are located. The traditional owners hold freehold title and native title over the entire exploration tenement which includes the project area.

Meetings were held with the Hope Vale community prior to commencing on-ground exploration activities. Conduct and Compensation and Cultural Heritage agreements were executed allowing both parties to proceed using a partnering approach to project definition and development.

Progress with the project to date has proven these agreements are providing benefits to both parties with open communication and providing a clear path for exploration and development activities. Representatives of Hope Vale Congress attend all Government and line agency meetings with Diatreme to assist in advancing the project.

Environmental Assessment

Biotropica Australia was engaged by Diatreme to undertake the terrestrial ecology component of the project.

For the purposes of this survey, a nominal project area was defined to cover the footprint of the likely components of the project (essentially the mining areas and some associated processing and administrative infrastructure) plus a small buffer area.

This area was current at the time of the wet season survey but could change, and future surveys may be required when planning is further advanced. The detailed findings from the survey by Biotropica Australia are presented in the report "Wet Season Survey Summary".

The project area is located near Cape Bedford and covers approximately 206ha. Figure 3 shows the project area that was studied and the vegetation communities that were mapped.

The ecological assessment will have to meet Environmental Impact Statement (EIS) guidelines and comprise a wet season and dry season survey component to properly consider the site's ecological values.

Figure 3: Vegetation communities map

The wet season survey was completed in January 2019 and the results are summarised in the report. This interim report details only the ecological constraints identified so far. A comprehensive assessment of overall values, impacts, mitigation and offsets in support of the EIS will be included in the final report after further surveys have been concluded.

A desktop review of online database searches and spatial datasets was conducted on relevant Commonwealth and State resources prior to ground survey.

To meet the desktop research requirements in the Flora Survey & Assessment in Northern Queensland (Wannan 2012), EPBC Act (Environment Protection and Biodiversity Conservation Act 1999) Protected Matters Search Tool (PMST) and NC Act (Nature Conservation Act 1992), Wildlife Online searches were performed for the project area with the recommended buffer (25km buffer for the Cape York Bioregion).

To obtain a more accurate determination of the species likely to occur within the project area, a further search of the PMST databases was undertaken, with a 3km buffer, using centre point coordinates of -15.3248, 145.2758.

Furthermore, a search of the Wildlife Online database using the same coordinates, returned only one species and therefore to ensure that all potential species are considered, the desktop results from Wildlife Online searches considers the 25km search.

The results of the searches were used to gain an insight into the Endangered, Vulnerable and Near Threatened (EVNT) species and Matters of National and State Environmental Significance (MNES / MSES) that may be present in the project area, and to allow targeted searches for these during field-based studies.

Between 21-25 January 2019 ecologists from Biotropica Australia conducted field surveys of the project area, comprising the wet season survey component of the project. This followed a reconnaissance survey undertaken on 8th and 9th January 2019 for the purpose of scoping the detailed work.

The closest Bureau of Meteorology Station is at Cooktown Airport which is less than 10km from the project area.

The data from this weather station shows there is a distinct wet season between December and April, with 88% of the annual rainfall falling within these months.

Whilst the temperature does also vary, it is not as significant as the rainfall. This survey was completed in January which is an appropriate timeframe for a wet season survey.

Surveys addressed the following elements:

- Verification of mapped remnant and non-remnant vegetation;
- Identification and prevalence of exotic species;
- Identification and prevalence of native flora, including the type and locality of habitats that may support conservation significant flora species (EVNTs) listed under the EPBC Act and/or NC Act;
- Identification and prevalence of native fauna, including the type and locality of habitats that may support conservation significant fauna species (EVNTs and migratory) listed under the EPBC Act and/or NC Act;
- Identification of habitat values – including remnant and non-remnant vegetation and watercourses;
- Gaining an understanding of ecological processes and systems present.

As noted, the MSES framework was used to assist in the assessment of values. The legislative ramifications will be addressed in the EIS. Further information is required, most of which can be collected during dry season surveys, on the presence and distribution of the following, before potential impacts can be addressed in the EIS:

- Verification of the orchid species presence and their abundance and distribution;
- Targeted flora surveys for Acacia solenota to determine presence or absence;

- Targeted Myrmecodia beccarii studies to confirm abundance and distribution;
- Targeted bat surveys to confirm their use of the site e.g. whether they breed or roost within the project area;
- Targeted surveys identifying distribution and abundance of Ctenotus rawlinsoni within the project area and surrounds;
- Wetlands (and associated groundwater and surface water hydrology);
- Marine Plants (linked to wetlands and hydrology issues);
- There is one RE which remains undetermined as there is no RE within the Regional Ecosystem Database that matches the description of that recorded within the project area. This RE would require clarification with the Queensland Herbarium.

Geology

The Cape Bedford to Lookout Point region of North Queensland is dominated by an extensive Quaternary sand mass and dune field that stretches inland from the present coast for approximately 10km and extends 50km from north to south. Cape Flattery is centrally located within this region.

The large transgressive elongate parabolic sand dunes evolved under conditions of persistent south-easterly winds on an exposed coastal aspect with sand supplies continually provided by an erosional shoreline during marine transgressions. Multiple episodes of dune building are evident.

The geology of the area is dominated by Cenozoic age sandy sequences overlying Mesozoic and Palaeozoic sediments which appear on the Cooktown 1:100,000 Geological Map.

The Devonian Hodgkinson formation comprising fine to medium grained greywacke interbedded with siltstone, mudstone and minor conglomerate crops out to the south and west of the project area and to the northeast near Cape Flattery. These rocks have been intruded by granites to the west of Hopevale and near Cooktown. Remnants of Mesozoic sandstone (Dalrymple Sandstone and Gilbert River Sandstone) overlie the Hodgkinson Formation.

The principal sand bearing units have a north-westerly trend and are largely of Pleistocene and Holocene age, although younger dunes formed by more recent wind erosion are common. Pleistocene dunes are commonly parabolic in shape and have thick subsoil (A2) horizons overlying orange, yellow or brown coloured sand. In places Holocene age dunes overlie the older sand sequence particularly closer to the coast. Quaternary units comprising sand, silt and clay often with blocks of Mesozoic sandstone are found close to the Mesozoic and Devonian rocks.

Exploration

There is limited historical exploration in the project area due to its relative remoteness and the sand dune system which is difficult to access by vehicle. Coupled with locally steep terrain, soft sand, and dense vegetation in places, only rudimentary investigations of the dunes had previously been completed.

Diatreme has identified six parameters as a strategy to prioritise exploration target areas:

1. Geology – Preserved older dune systems with well-developed podzolisation and preservation of the A2 horizon hosting the leached white sand;
2. Sand Quality - Identification of >99% SiO_2 or containing >1% heavy minerals;
3. Size – Identify exploration targets in excess of 20 Mt;
4. Access – Close to existing road infrastructure for access and logistics;
5. Environmental – avoiding identified environmentally significant areas;
6. Cultural – respect for cultural heritage and traditional owners' values.

In September 2017, exploration commenced utilising a company owned air-core drilling rig in the project area.

During September and October 2017, 55 holes were drilled totalling 1,276 metres and an additional 41 holes totalling 824 metres were drilled in the June 2018 quarter.

The dune sand which is the target for exploration comprises white to cream and light grey, fine grained sand with some areas of yellow, orange and brown colouring.

Drilling did not indicate any clay bands within the upper sand unit.

The base of the target geological sequence comprises fine grained red to brown coloured sand representative of an older weathering surface of the Devonian Age Hodgkinson Formation.

The target silica sand is generally fine grained, although logging indicated some fine to medium grained sections. Detailed chemical analyses showed the majority of the samples contained greater than 98.5% SiO_2, with variable proportions of Al_2O_3, Fe_2O_3, TiO_2 and Cr_2O_3 indicating the presence of clays, iron oxides and heavy minerals.

Five drilling campaigns have been undertaken between September 2017 and November 2018 of which 75 holes were used to define JORC Compliant Indicated and Inferred Resource boundaries for both the East and West Nob Point dunes.

Drilling samples for all drilling campaigns were delivered to Australian Laboratory Services Ltd (ALS) for standard silica sand assays and selected samples have also had particle size distribution (PSD) analysis.

Drilling to date within EPM17795 has been on Lot 35/SP232620, a freehold lot of 110,000 hectares within the Hope Vale Aboriginal Shire. The Galalar project target sand is high value, high silica sand that will, subject to approvals, be mainly shipped for sale to export markets.

Drill holes numbered CB001 to CB095 from the first four drilling campaigns were sampled and logged in 3m intervals.

The most recent drilling campaign (CB096 to CB114 and twinned holes) was sampled and logged in 1m intervals. Chip tray samples were also collected for the sampled intervals and the trays were photographed and stored. Figure 4 overleaf is a map showing the locations of drill holes used for the Galalar project's Mineral Resource estimate.

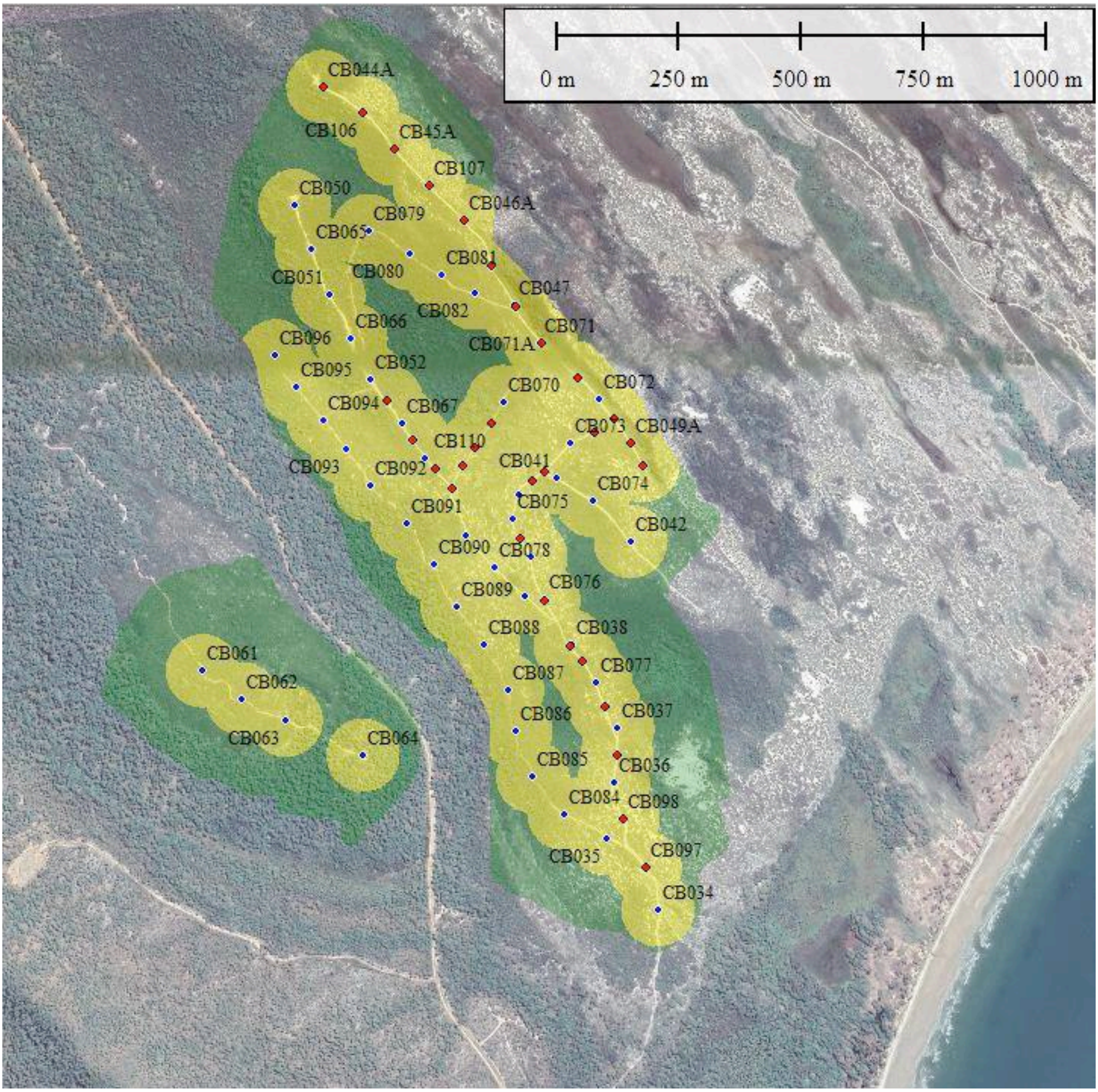


Figure 4: Mineral Resource drill locations

In March 2019 a regional sampling program across all potential silica sand resource areas within EPM17795 was completed. This program used a helicopter for access to the sand dunes where the vegetation was low enough to allow safe landing. One metre sand samples were taken at each location using a hand auger.

The aim of the program was to;

1. Ground truth assumptions made from satellite images of target areas.
2. Collect representative samples of sand for quality analysis.
3. Determine land access options to target areas.
4. Reconcile historic exploration, namely drill hole location, quality data and analysis.

The majority of the areas sampled using a helicopter for access are not easily access by land. There are some minor existing vehicle tracks which would allow dry season activity close to the tracks. For this reason the majority of the exploration area has not previously been explored.

This sampling program using a helicopter allowed access to most of the major dunes in locations where there was no or minimal vegetation cover. Use of the helicopter also gave a significantly better visual assessment of sand dunes for size, continuity and sand colour.

The sampling was completed using a hand auger to vertically sample the first metre interval below the identifiable topsoil layer. Generally, at least 2 samples were collected at most sample locations, at least 100m apart to determine potential variation in the sand dune. The samples were dispatched to independent laboratory ALS in Townsville for size analysis and XRF assays.

Results confirmed the existence of high purity silica sand in most target areas confirming the targets have favourable size analysis, SiO_2 and Fe_2O_3 grades to justify further exploration. The Gubbins Range area contained high quality silica sand and higher TiO_2 grades than elsewhere in the EPM.

The regional exploration program identified four priority target areas for future exploration:

1. Elim Road South. This area is closest to the existing defined Galalar Mineral Resource and would use the currently planned product logistics system through Cooktown port for ship loading.

2. Elim Road North. This area is close to Elim Road South and is on the northern side of Elim Road. It would also use the Galalar product logistics system.

3. Casuarina Hill. This dune system adjoins the Cape Flattery Silica Mines (CFSM) operation where CFSM has mined up to the tenement boundary. There are currently no land access tracks through EPM17795 and exploration activities are hindered by dense vegetation. This area is close to the port of Cape Flattery and product logistics through this State owned port will require negotiations for an easement through a tenement held by CFSM.

4. Gubbins Range. This sand dune system is located mid-way between the Galalar project site and the CFSM operation. Assays of the auger samples from this area indicated the presence of higher heavy mineral grades than elsewhere in the EPM along with the high quality white silica sand found across most of the tenement.

   12 auger samples were collected from this dune system at six locations on three of the major sand dunes. TiO_2 grade ranged from 0.32% to 1.17% and averaged 0.8%.

   This confirms historic sampling conducted in the dune system in 1981 by T. Essington Breen exploring under ATPs 2546M & 2546M (EPMs). Samples from the north, south, east and west of the Gubbins Range sand dune system contained on average 1.5% heavy minerals within the high grade white silica sand. Analysis of the HM indicated a mineral assemblage of 75% ilmenite, 10% zircon and 5% rutile from the shallow auger samples.

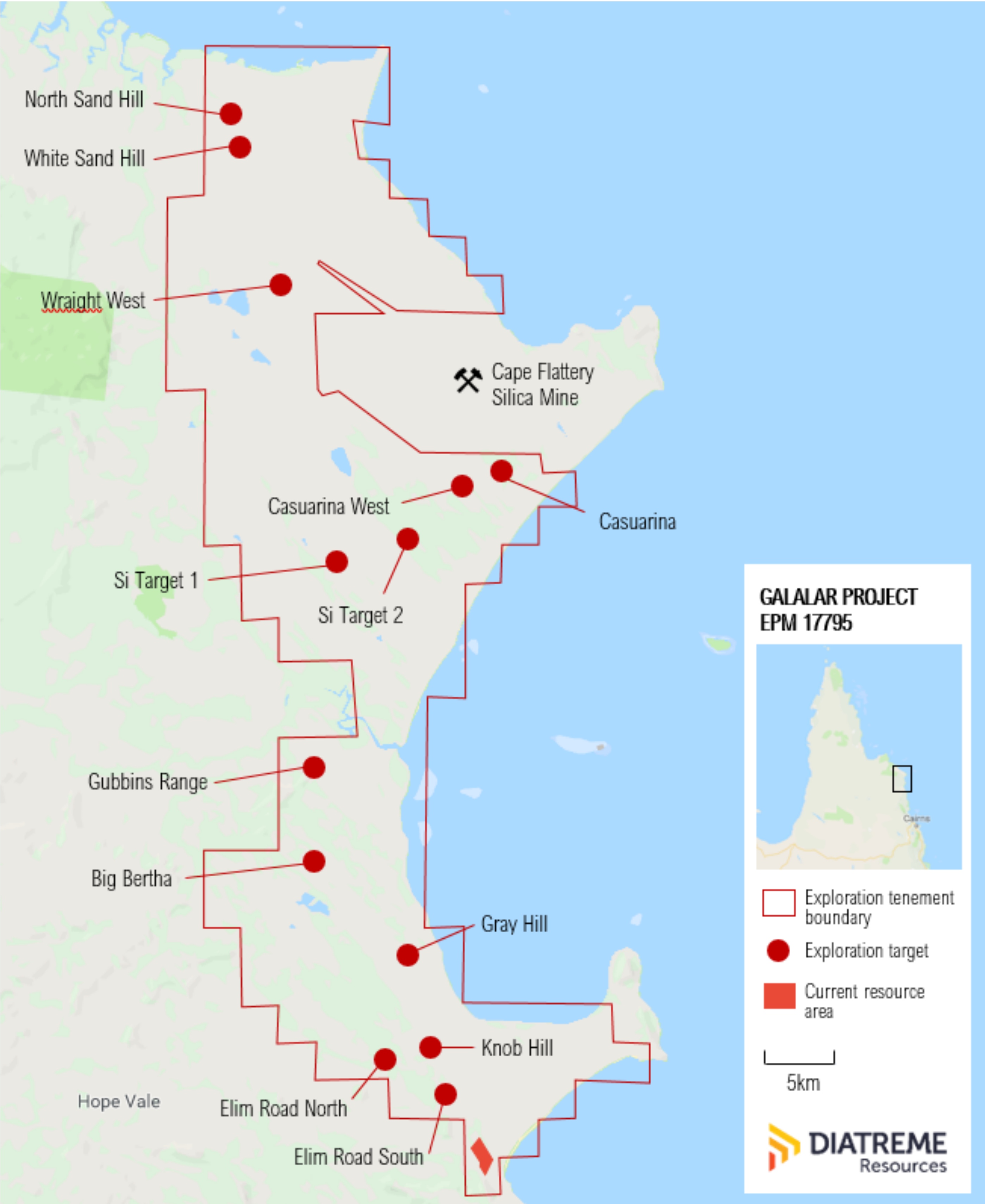


Figure 5: Exploration targets

Target	Description	Prelim Vol	Resource Target	Ground Access Comments
Casuarina Hill	Immediately south of CPSM working pit and closest to port facilities Large high dune covered in vegetation and large stand of Hoop Pine Difficult to access via vehicle, foot and helicopter	1,200m Long x 800m wide up to 30m high 28,800,000 m^3	20 to 40 Mt	Access from Beach to southern area. Best access will be from Mining Lease
Casuarina West	Long sand dune south of mine workings Difficult to access	2,000m long by 250m wide up 20m high 10,000,000 m^3	5 to 20 Mt	Access from Beach
Elim Road North	North of Elim Road, very large forest covered dune system. Access is very difficult	6km long, 3km wide and 50m high 900,000,000 m^3	100 to 1,000 Mt	Access from Elim Road, will need a new track.
Elim Road South	South of Elim Road, northern continuation of Nob Point Dune System Difficult to access	4km long, 800 to 1,200m wide and 20m high 80,000,000m^3	20 to 100 Mt	Access off Elim Road from the north, and Nob Point Road from the west.
Silica 01	Large area of exposed sand dunes clustered together. Iron stained sand in colour probably from remobilisation.	6 x 1km long, 500m wide up to 50m high 60,000,000 m^3	20 to 80 Mt	Near access track from west
Knob Hill	Large dune parallel to Elim Road north and west of coloured sands Basement is visible Appears slightly contaminated by basement May be part of coloured sands		-	Access from Elim Road, will need a new track.
Silica 02	Large sand dune system covered in vegetation Hard to access	8,000m long, 1,250m wide and 30m high 300,000,000 m^3	50 mt to 500 Mt	Access from beach
Wraight West	Dune system immediately west of ML 7069 Mt Wraight which is northern Satellite ML	1,000, long, 800m wide and 20m high 16,000,000	5 to 20 Mt	
Gray Hill	Longitudinal dune running NW from coloured sands, with a large parabolic sand dune adjacent known as Grey Hill.	6km long, 200m wide, 40m high 24,000,000 m^3	10 to 30 Mt	Access from beach at Elim
Big Bertha	Longitudinal and exposed dune system about 10km NW of Elim Beach. Large exposed dune	1,200m long, 600m wide and 40m high	10 to 50 mt	An existing local road accessing McIvor River Road approximately 4km to the west
Gubbins Range	Large parabolic dune with associated elongate parabolic dunes. Intersects Gubbins Range basement rocks south of McIvor River	6,000m x 200m		Potential access from west from McIvor River Road

Table 1: Regional exploration targets within EPM17795

The March 2019 regional exploration program was followed by a hand auger reconnaissance program in May 2019 to investigate the Elim Road South and Elim Road North targets for possible extensions to the Galalar mineral resource. The locations of these potential resource areas and future exploration drilling lines are shown in Figure 6.

Four metre deep vertical auger holes were drilled and samples taken for each one metre interval. The holes generally produced three samples suitable for analysis from one metre depth to four metres depth with the top one metre excluded due to a significant quantity of topsoil at the surface.

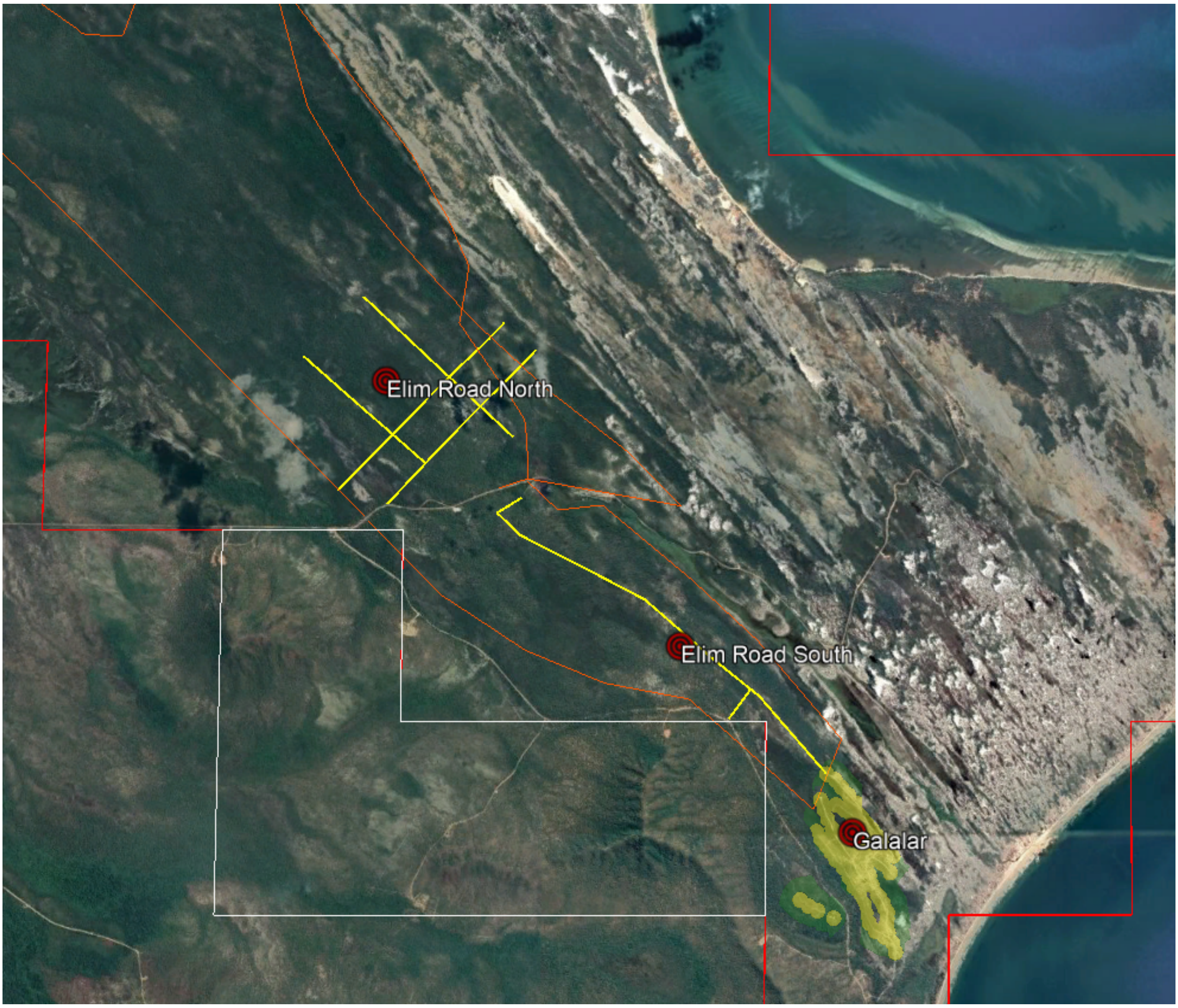


Figure 6: Elim Road North & South showing future drill lines.

Results from ALS assays of the samples confirm the sand dunes at Elim Road South and Elim Road North contain high purity silica sand. Nearly all auger holes returned white sand samples with higher than 99% SiO_2.

These are long established stabilised dunes mapped and interpreted to have well developed podzolic profiles containing high purity silica sands. They are an extension of the Galalar dune system and are likely to contain significant volumes of silica sand as these dunes are large and extensive.

Elim Beach Road runs east-west between these two dune areas and the best located areas within the tenement for the existing product land transport route to Cooktown. These two areas are also further from the coast and more distant from environmentally sensitive wetlands.

Future work will involve construction of tracks for a deep drilling program to obtain additional data for white sand depth and one metre assays for use in estimation of potential Inferred resources for these areas.

Mineral Resource

Diatreme engaged AusRocks Pty Ltd to complete a Mineral Resource estimate for the Galalar project. AusRocks is a Brisbane-based resources consultancy with expertise in industrial minerals and quarrying. AusRocks determined that the exploration program to date had obtained sufficient information to enable estimation of an Inferred Resource for Galalar.

The topography of the area ranges from the coastline up to 68 metres above sea level (RL) at the peak of the dunes. The main topographic features of the resource area are two sand dunes.

The western dune resembles a hill with a gentle increase in gradient from all sides to the peak at approximately 60m RL AHD. The eastern dune has a maximum height of 68m and has varying undulations from weathering on the surface and a blown-out area on the eastern boundary. Natural slopes on the north-eastern boundary of this dune are close to 20 degrees, however these steep areas are of limited extent. Figure 7 is a topographic map of the project area showing surface contours at an interval of 5m elevation.

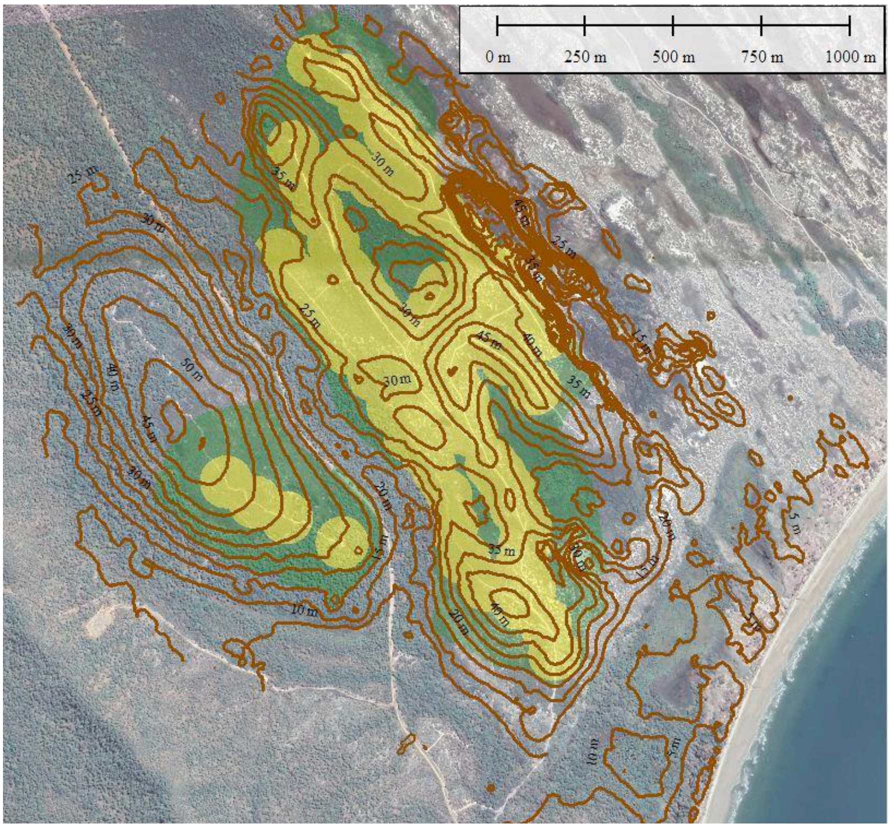


Figure 7: Surface contours (5m interval)

Diatreme has completed five drilling programs within EPM17795 over a three-year period to progressively identify and refine the Galalar resource area. Ausrocks reviewed all mineral samples and metallurgical testwork data to ensure only valid and relevant data was used for the resource estimate. Data from 75 drill holes was used as inputs to the mineral resource model. AusRocks used Surpac Software 6.6.2 and modelled the data using the inverse distance interpolation method.

A review of all silica assays from the Galalar area indicated that SiO_2 content by percentage would be used to quantify in-situ material as a resource. From the 75 drill holes that were used in the resource estimate, the %SiO_2 in the target silica sand zone varied from 98.2% to 99.99%, with a weighted average by drill hole composite of 99.25% of all the assayed values.

This data and the bulk sample data indicated that >99% SiO_2 in-situ material could be processed into a >99.9% SiO_2 product and meant that an overall cut-off grade of >99% SiO_2 was appropriate to use for the Indicated and Inferred Resource estimate completed in accordance with the JORC Code.

The drill hole data was input to Surpac 6.6.2 Software and modelled using the inverse distance method. The resource was defined as the material that could be blended to create high value silica sand products (>99%).

Digital Elevation Models (DEM) were created for the top and the base of the resource and volumes calculated between the two DEMs and the lateral constraint of the resource boundary. The southern constraint is defined by the intersection of the two DEMs, the western constraint is a 50m offset from a creek, and the northern and eastern constraints are interpreted from the extent of the drilling. Drill hole data indicates the resource is open to the north and the east.

Geological work and resource modelling indicate the East Nob Point deposit averages 16.7m vertically, 2,000m long (N-S) and 700m wide. West Nob Point is 650m long and 400m wide. Figure 8 shows the indicated and inferred resource boundary, drill hole locations and cross-section lines used for the cross sections that follow.

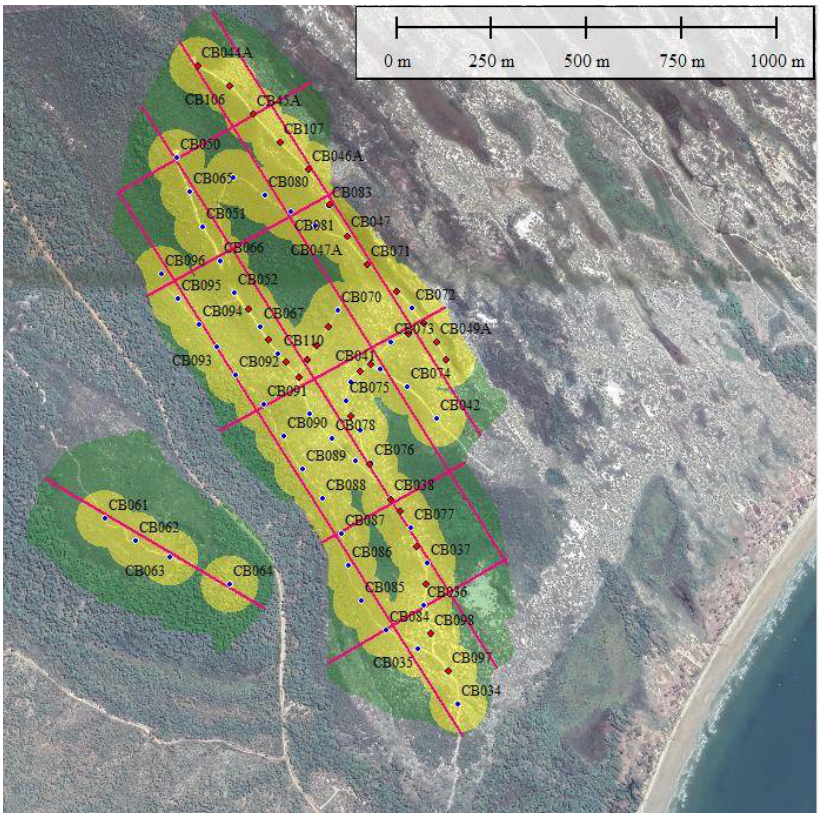
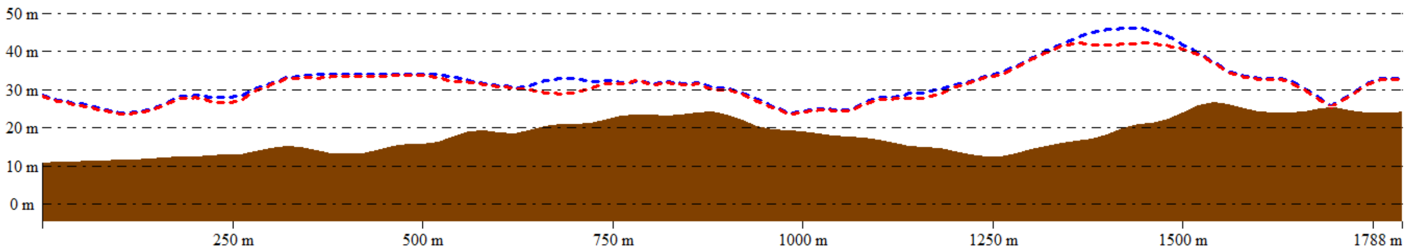


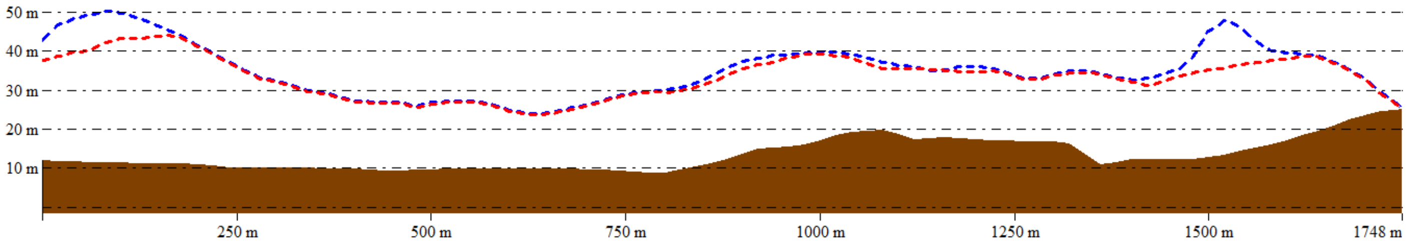
Figure 8: Drill hole locations and resource boundary

Three typical longitudinal cross-sections are shown in Figure 9. The vertical axis interval on the cross sections is 10m and the horizontal axis interval is 250m.

A-AA



B-BB



C-CC

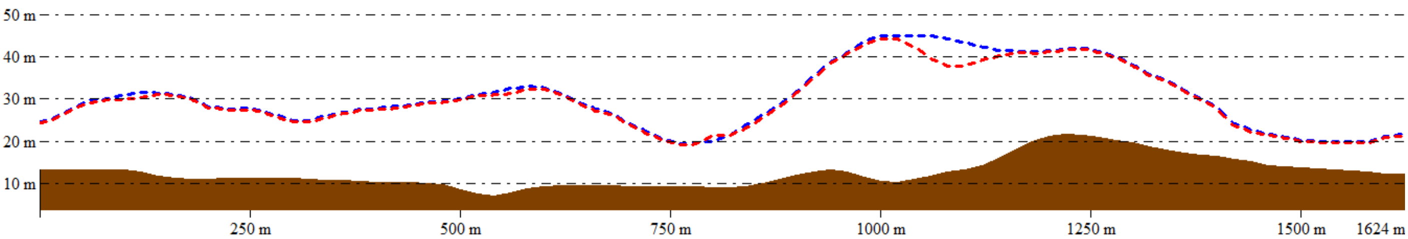


Figure 9: Three typical longitudinal cross-sections

Mineral Resource Estimate:

Area	Cut-off SiO_2%	SiO_2% Grade	Indicated (Mt)	Inferred (Mt)	Inferred & Indicated (Mt)
East Nob Point	99%	99.26%	20.2	6.6	26.8
West Nob Point	99%	99.16%	1.3	2.1	3.4
Total			**21.5**	**8.7**	**30.2**
** Resource Estimate current as at 20 March 2019*					

Table 2: Mineral Resource estimate

The resource at East Nob Point is open on the northern and eastern sides, and West Nob Point is open to the north. This provides opportunities to increase the Mineral Resource across all geological confidence intervals (Inferred, Indicated, and Measured). Analysis of the sample data revealed that there was little correlation between the colour of the sand in the resource zone and the SiO_2 grade.

Density testing was completed on 55 samples taken using a Dormer push tube. Analysis of the samples provided an estimated average bulk density of 1.62 tonne per cubic metre which was suitable for use in the Mineral Resource Estimate. The resource is currently reported as in-situ tonnage with a moisture content of 2.5%. These density test results are suitable for use in future Mineral Resource estimates in this area.

To satisfy the requirements of the JORC code for future Mineral Resource updates the following drilling grid will be used as a guideline:

- Inferred Mineral Resource 200m x 200m drill spacing.
- Indicated Mineral Resource 75m x 75m drill spacing.

Metallurgical Testwork

Six bulk samples from six drill holes underwent preliminary metallurgical testing by IHC Robbins (IHCR) using gravity separation on wet shaking tables to determine the recovery and grade of potential silica products.

In July 2018, IHCR was engaged to process 500 kg of sample extracted from a 1,800 kg bulk sample taken from 32 drill holes across the resource. Spiral separators typical of the gravity separation equipment used in commercial processing plants were used to remove heavy minerals from the sample and produce a silica sand product.

A Chinese glass industry research group, Bengbu Design & Research Institute (BDRI) was engaged in December 2018 for metallurgical testwork on a 355 kg sample from selected intervals of 19 drill holes.

This testwork was to apply various metallurgical processes to the sample with the objective of reducing the Fe_2O_3 grade below 100ppm and as low as reasonably possible using standard processing equipment and methods.

IHCR Shaking Table Testwork

Preliminary metallurgical testwork was undertaken on six bulk samples from six drill holes (CB037, CB038, CB047, CB048, CB053, CB054) from the October 2017 drilling program. Each sample was initially characterised to determine the amount of oversize (+1mm), slimes (-45 micron) and heavy minerals (+2.8 SG) in each sample. The results of the head feed characterisation testwork are presented in Table 3.

Sample ID	Sample (kg)	Oversize (%)	Slimes (%)	HM (%)
CB037 (3-21m)	95	0.3	2.5	0.19
CB038 (3-21m)	92	0.1	1.4	0.32
CB047 (3-27m)	133	0.0	2.1	0.06
CB048 (3-27m)	121	0.0	2.0	0.18
CB053 (3-21m)	96	0.0	2.2	0.16
CB054 (3-12m)	60	0.1	3.1	0.18

Table 3: IHCR 6 bulk sample characterisation

The sample characterisation showed that all samples had low levels of oversize and slimes and were low grade in heavy minerals.

The bulk samples were processed through two stages of wet shaking table separation to remove heavy minerals and produce a primary silica product from the first stage and a secondary silica product from the second stage of separation. Figure 10 overleaf is a photo of the first stage of separation showing good separation of heavy mineral from the silica sand.

Figure 10: IHCR shaking table separation of silica and heavy minerals

Product recoveries and grades for the first stage of separation are presented in Table 4 and for the second stage of separation are in Table 5.

The second stage was reprocessing the tailings (HM component) produced from the first stage.

Sample ID	Product Recovery (%)	SiO_2 %	Al_2O_3 %	Fe_2O_3%	TiO_2%
CB037	86	99.67	0.04	0.01	0.02
CB038	69	99.78	0.06	0.02	0.03
CB047	79	99.66	0.04	0.01	0.02
CB048	83	99.87	0.04	0.01	0.02
CB053	84	99.61	0.05	0.01	0.02
CB054	84	99.64	0.05	0.01	0.02

Table 4: IHCR first stage shaking table product assays

Sample ID	Product Recovery (%)	SiO_2 %	Al_2O_3 %	Fe_2O_3%	TiO_2%
CB037	12	99.5	0.11	0.03	0.07
CB038	28	99.5	0.11	0.04	0.07
CB047	18	99.5	0.06	0.01	0.03
CB048	14	99.5	0.06	0.02	0.05
CB053	15	99.3	0.12	0.03	0.07
CB054	15	99.3	0.15	0.04	0.08

Table 5: IHCR second stage shaking table product assays

The first stage products had high recovery and high SiO_2 grades in the range 99.61% to 99.87% and low Fe_2O_3 grades in the range 0.01% to 0.02% (100ppm-200ppm). The grade of the primary products indicates this silica sand is suitable for high clarity glass production. The second stage products had higher Fe_2O_3 and would be suitable for lower clarity glass production.

IHCR Spiral Separator Testwork

Diatreme engaged IHC Robbins to complete full scale spiral separation testwork on a bulk sample that was taken from 32 drill holes across the entire resource area during June 2018. Diatreme provided 1,800kg of sample and IHCR extracted a representative 500kg sample for process testwork using an MG12 spiral and a MT10 spiral.

Characterisation results for the 500kg bulk sample:

- Oversize +1mm 0.0%
- Slimes -45 micron 3.0%
- Heavy mineral +2.85SG 0.19%

The MG12 spiral performed better than the MT10 spiral. The results for product produced from the MG12 spiral were:

- Silica sand recovery 88.3%
- SiO_2 grade 99.9%
- Al_2O_3 grade 0.07%
- Fe_2O_3 grade 0.02%
- TiO^2 grade 0.03%

BDRI Low Iron Bulk Sample Testwork

BDRI was engaged by Diatreme in November 2018 for metallurgical testwork on a 355 kg sample from selected intervals of 19 drill holes. This testwork was to apply various metallurgical processes to the sample with the objective of producing a silica product with higher than 99.75% SiO_2 and Fe_2O_3 grade less than 100ppm and as low as reasonably possible using standard processing equipment and methods. BDRI conducted the testwork during November and December 2018 and produced a technical report in December 2018.

The BDRI testwork produced high purity silica sand products with specifications as follows:

- Silica sand recovery (%) 78.82 - 79.40
- Silica sand grade (SiO_2%) 99.66 - 99.77
- Al_2O_3 (%) 0.040 - 0.058
- Fe_2O_3 (%) 0.0083 - 0.0088
- TiO_2 (%) 0.013 - 0.015
- 125-710 micron (%) 99.13

BDRI produced a product with 83ppm to 88ppm Fe_2O_3 using non-chemical processes involving:

- 3 stage gravity separation on spirals
- Attritioning
- Classification
- Magnetic separation

BDRI then used chemical processes (hot acid leaching) on this product to further reduce the iron level by removing surface iron attached to the silica grains. Various types and concentrations of acid were used and the specifications for the silica product produced from the chemical processes were:

- Silica sand recovery (%) 78.41 - 78.66
- Silica sand grade (SiO_2%) 99.76 - 99.82
- Al_2O_3 (%) 0.027 - 0.031
- Fe_2O_3 (%) 0.0072 - 0.0074
- TiO_2 (%) 0.015 - 0.017
- 125-710 micron (%) 99.24

Both low iron products produced by BRI are expected to be widely used in the production of photovoltaic rolled glass, ultra-clear glass, high-grade utensils and in the electrical industry.

An additional acid leaching test using concentrated sulphuric acid reduced the Fe_2O_3 grade to 0.0064% (64 ppm). This demonstrated the limit of iron reduction with an extremely aggressive chemical process and this process would not be justifiable in a commercial production plant.

The mineral composition of the heavy mineral concentrate removed by gravity separation on spirals included ilmenite, zircon and rutile. The heavy mineral concentrate produced generally had a grade in the range 3% to 5% HM. The grade of the valuable components of the heavy mineral concentrate were up to 0.5% ZrO_2 and 2% TiO_2.

Chemical analysis of the 355kg bulk sample before processing is shown in Table 6.

Table 7 shows the reduction in Fe_2O_3 from the initial 260ppm (0.026%) to 83ppm through the processing stages of classification, gravity separation, attritioning and magnetic separation.

Chemical composition	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	K_2O	Na_2O	CaO	MgO	L.O.I	ZrO_2
Content（%）	99.62	0.076	0.026	0.040	0.0079	0.0076	0.0033	0.0073	0.16	0.0020

Table 6: Bulk sample analysis before processing (BDRI report)

Sample	Concentrate index（%）			
	Product rate of process	Product rate to the raw ore	SiO_2	Fe_2O_3
Classified settling sand	94.74	94.74	—	0.022
First gravity separation concentrate	94.66	89.68	—	0.011
Second gravity separation concentrate	95.67	85.79	—	0.0097
Third gravity separation concentrate	94.83	81.36	—	0.0095
Medium magnetic separation concentrate	98.00	79.74	—	0.0083
First strong magnetic separation concentrate	97.74	77.93	—	0.0083
Second strong magnetic separation concentrate	96.64	75.31	99.76	0.0083

Table 7: Processing stages and Fe_2O_3 reduction (BDRI report)

The physical processing tests show:

- Gravity separation has a significant effect on the reduction of Fe_2O_3 content in the concentrate. After three stages of gravity separation the Fe_2O_3 content of the concentrate can be reduced to 95ppm.
- Following classification and gravity separation, the use of attritioning and high intensity magnetic separation will further reduce the Fe_2O_3 to 83ppm.

The particle size distribution and chemical assays by size range are shown in Table 8. The coarse size fractions are higher in SiO_2 and lower in Fe_2O_3 than the fine fractions.

Particle size（mm）	Weight（g）	Distribution（%）	Accumulation（%）	Chemical composition（%）	
				SiO_2	Fe_2O_3
+0.71	0.5	0.33	0.33	99.71	0.0082
-0.71+0.6	0.9	0.60	0.93		
-0.6+0.5	5.3	3.52	4.45		
-0.5+0.3	35.0	23.27	27.73	99.74	0.0083
-0.3+0.2	46.6	30.98	58.71		
-0.2+0.15	53.0	34.42	93.13	99.76	0.0087
0.15~0.125	7.1	5.54	98.67		
-0.125	2.0	1.33	100.00	99.69	0.011
Subtotal	150.4	100.00	—	—	—
Weight before screening	150.4g			—	—

Table 8: Particle size distribution and chemical assays (BDRI Report)

The low Fe_2O_3 silica product that was produced by physical separation was then subjected to chemical processing using hot acid leach tests as shown in Table 9. These test showed that the Fe_2O_3 content could be further reduced to 64ppm by hot leaching with 30% sulphuric acid.

Test No.	Medium and amount（kg/t）	Concentrate index（%）		
		Product rate of process	Product rate to the raw ore	Fe_2O_3
Aus-10	98%H_2SO_4：300	98.90	74.47	0.0064
Aus-11	98%H_2SO_4：250 40%HF：50	98.85	74.95	0.0065
Aus-18	Waste acid：400	99.87	74.23	0.0066

Table 9: Hot acid leach test results (BDRI report)

The processing testwork completed by BDRI demonstrated that low iron silica products (80-100ppm) could be produced from the Galalar bulk sample which had an initial iron content of 260ppm.

- The testwork indicates that the recommended product should have a target range of 80-100ppm for Fe_2O_3 using physical separation only. The option of additional chemical processing could reduce the iron content to 60-80ppm but this is not likely to be a viable processing stage due to high processing costs including environmental compliance.
- The low iron products (<100ppm Fe_2O_3) that can be produced from Galalar ore are expected to be suitable for use in photovoltaic rolled glass, ultra-clear glass, high quality container glass, and electronic grade silicon micro powder.
- By-products from the testwork included fine silica sand from the classification process and heavy mineral concentrate from the gravity separation process and the magnetic separation process. Ilmenite, zircon and rutile could be produced from the heavy mineral concentrates. The fine classified silica sand could be used to produce glass fibre sand.

Production Target

This study used a production target of 11.25m tonnes of low iron silica product for export over a period of 15 years. The annual production rate is 750,000 tonnes which requires an annual mining rate of 950,000 tonnes, allowing for the low iron silica recovery factor of 79% determined by BDRI during its process test work.

BDRI's test work produced a silica product with 83ppm Fe_2O_3 from a bulk sample which was extracted direct from the Mineral Resource using an air-core drilling rig.

The recovery reported by BDRI is supported by the 88.3% recovery reported by IHCR from spiral separator testwork which produced a silica product with 200ppm Fe_2O_3 from gravity separation alone.

The total production target requires 14.2m tonnes to be mined from the 30.2m tonne Mineral Resource estimate. The indicated resource for the Galalar project is 21.5m tonnes and the total production target for the 15-year project evaluation is a conversion factor of 66% from the indicated Mineral Resource to low iron silica production target.

Proposed Production Schedule

The production target is based entirely on Indicated Mineral Resources and does not use any Inferred Mineral Resources. The production target has been modelled over a 15-year mine life with an annual mining rate of 950,000t and an annual production rate of 750,000t of low iron silica product. The schedule for production and the Mineral Resource category on which the production is based is presented in Table 10 below.

Production Year	Mined Tonnes	Tonnes Produced	JORC Mineral Resource Category
1	950,000	750,000	Indicated
2	950,000	750,000	Indicated
3	950,000	750,000	Indicated
4	950,000	750,000	Indicated
5	950,000	750,000	Indicated
6	950,000	750,000	Indicated
7	950,000	750,000	Indicated
8	950,000	750,000	Indicated
9	950,000	750,000	Indicated
10	950,000	750,000	Indicated
11	950,000	750,000	Indicated
12	950,000	750,000	Indicated
13	950,000	750,000	Indicated
14	950,000	750,000	Indicated
15	950,000	750,000	Indicated
15-Year Total	**14,250,000**	**11,250,000**	**100% Indicated**

Table 10: Production Schedule and JORC Mineral Resource Indicated Category

The production schedule is based entirely on Indicated Resources and the total production target of 11,250,000t of low iron silica will utilise only 66% of the available Indicated Mineral Resource.

Mining Operations

The mining operation and processing plant will operate as a continuous process for 24 hours per day and 360 days per year. The shift roster will be a four-crew system and the crews will rotate on a schedule to be finalised following detailed discussions with the local employees. There will be no site camp and all personnel will reside at Hope Vale or Cooktown during their work roster.

The mining operation will commence with the removal of large vegetation on the mining areas ahead of the planned mining operation using a bulldozer. Where possible vegetation will be pushed or transported off mining areas and stockpiled for future use in rehabilitated areas.

Mulching and burning may be used if these processes can be demonstrated to have benefit for rehabilitation. The remaining smaller vegetation and topsoil will be pushed into stockpiles using a bulldozer and the stockpile transported off the mining areas. Where possible this vegetation and soil mix will be returned directly to rehabilitation areas as these areas become available. The average depth of the sand to be mined is greater than 15m and the average area to be prepared for mining averages less than four hectares per year.

The exposed silica ore will be excavated using a front end loader and loaded directly into a hopper-feeder unit at a rate of 138t per hour for 19.2 hours per day and 360 days per year. The average daily operating hours allows for maintenance and operational downtime, and the days per year includes an allowance of 5 public holidays that would not be worked. The hopper-feeder unit will screen out oversize rubbish and pump the sand to a mobile wet spiral plant in slurry form at a controlled feed rate of 138 tonnes per hour (tph).

The hopper-feeder unit will include:

- Coarse screening at 50mm aperture
- Hopper and feed conveyor
- Water supply pipeline
- Wet trommel screening at 1mm aperture
- Constant density sump
- Slurry pump and pipeline

Processing Plant

The slurry from the hopper-feeder unit will be pumped into a controlled density tank at the wet processing plant. Processing equipment will include spirals, attritioners, classifiers, and magnetic separators to remove heavy mineral, release surface impurities from the silica, remove fine particles, and remove magnetic particles.

Heavy mineral concentrate will be stockpiled for further concentration and sale when sufficient stocks have accumulated. Fine particles removed during processing will be pumped to a dam for settling to allow reuse of the process water. The low iron silica product will be dewatered and stockpiled ready for transport. The process flow in the wet spiral plant is as follows:

- 138 tph slurry from the controlled density tank will be pumped to a two stage spiral circuit which will be designed to remove heavy mineral and slimes from the ore.
- the spirals will achieve a recovery in the order of 85% and produce silica concentrate with approximately 200ppm Fe_2O_3 at a rate of 117tph.
- The silica concentrate will be attritioned, classified and magnetically separated to remove fine particles of silica, iron, heavy mineral and clay.
- The silica product that will be produced after magnetic separation will have a grade of 80-100ppm Fe_2O_3 and will be produced at a rate of approximately 110tph.
- Heavy mineral and fine sand removed by the spirals will be dewatered using a hydrocyclone and stockpiled on the site.
- Slimes and fine particles removed during processing will be pumped to a dam for settling, dewatering, and later covering for rehabilitation.
- Upgraded white silica sand produced by the spirals will be pumped to a stockpile area where it will be dewatered using a hydrocyclone, stockpiled and allowed to drain to a low moisture content.

The low moisture product will be loaded onto the 50t double road trains for transport to Cooktown. The plant's gravity separation area will be a standard Mineral Technologies 150 tph processing circuit using MG12 spirals to remove the heavy minerals. The plant's surplus capacity will allow for variations in the feed rate to maintain an average processing rate of 138 tph.

Independent testwork by IHCR has shown that these spirals are efficient for this gravity separation duty and will reduce the silica's iron content to 200ppm Fe_2O_3 with a recovery to silica product of 85%. Figure 11 shows the flowsheet for the plant feed system and the heavy mineral separation circuits in the processing plant.

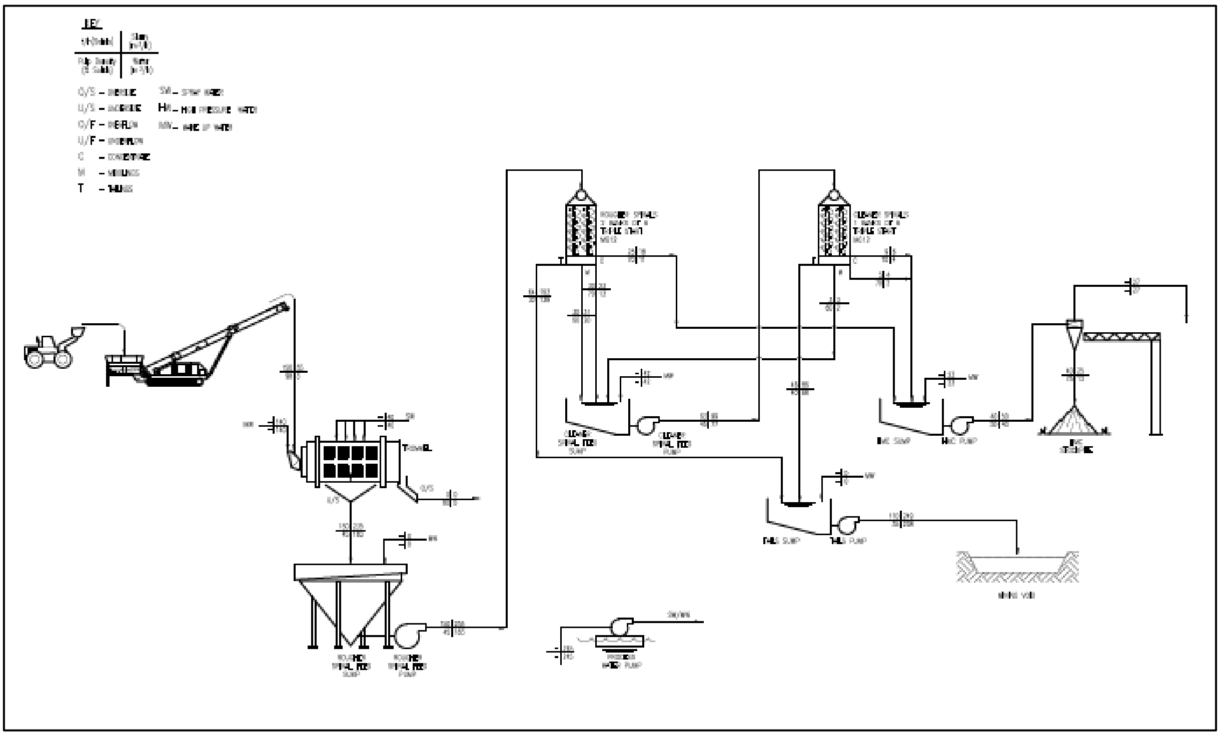


Figure 11: Mineral technologies 150tph MG12 spiral flowsheet

Diatreme engaged IHCR to complete a scoping study engineering report on the process to upgrade the silica sand produced by the spiral separators to a low-iron silica sand product.

IHCR developed a flowsheet (Figure 12) based on the BDRI report which demonstrated that low-iron silica could be produced by attritioning, classifying and magnetically separating the silica sand produced by the spiral separators.

Power Supply

The site's power supply will be a hybrid diesel-solar system where diesel generators will supply the base load and solar panels will provide a variable supply during the day to reduce the diesel fuel consumption.

The solar panels will also be used as a back-up supply for offices and workshops during generator maintenance. The diesel generators will be sized to suit the full site power demand which is expected to be up to 750 kilowatts (kW).

The power demand for the processing plant has been estimated from reports by Mineral Technologies for the spiral plant and IHCR for the silica upgrade plant.

Table 11 provides the estimated processing power demand to produce low iron silica. Other power demand for the site includes offices and workshops which are expected to have a combined power demand well below 20kW.

Process Component	Power Demand (kW)
Plant feed system	90
Trommel	5
Process water pumps	24
Spiral feed pumps	96
Silica upgrade circuit pumps	125
Attritioner cells	144
Wet high intensity magnetic separators	126
Rejects pumps	58
Silica product pump	59
TOTAL	727

Table 11: Estimated power demand for the processing plant

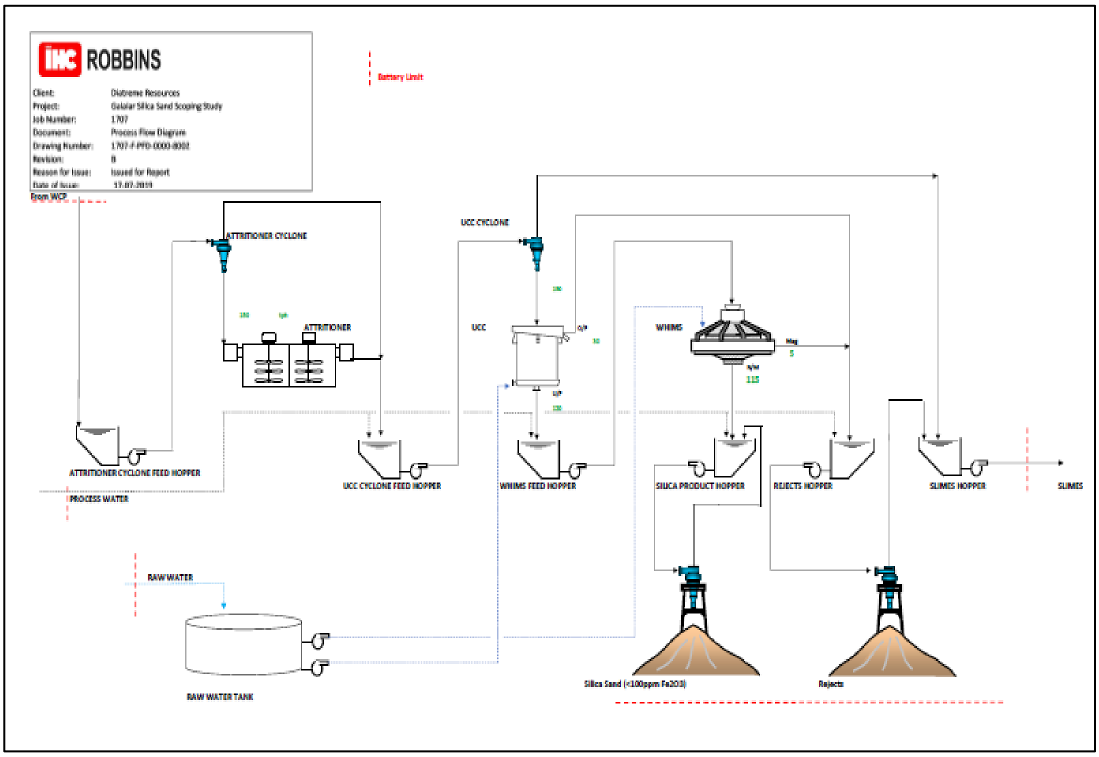


Figure 12: IHCR flowsheet for upgrading spiral product to low-iron silica sand

Water Supply

The estimated water requirement for the mine and site facilities is 500 megalitres per year. This supply is expected to be obtained from groundwater bores close to the mine site. Exploration drilling has intersected the main water table in sand below the mineral resource. There has been no hydrogeological investigation of the water table to determine the potential yield from bores, but the geology and rainfall is similar to Cape Flattery where that silica mine obtains a suitable water supply for an operation in excess of 2 million tonnes per year.

Water recycling dams will be used to minimise the requirement from water bores. Most of the water losses on the site will result from seepage into the ground from dams, product stockpiles, and by-product stockpiles.

The only water lost from the site will be small quantities lost as evaporation and moisture transported from the site in the product. Water bores and spears close to the operations will effectively be able to recycle a large proportion of the water that seeps into the ground.

Diatreme has discussed the project and its water requirements with the allocated Manager for Water Planning at the Cairns office of the DNRME. The relevant water management area is the Endeavour River catchment which is included in the Cape York Water Planning process. The Water Management Protocol for the Cape York Water Plan will be released shortly and will be operational by October 2019.

The Endeavour River catchment has surplus water allocation that is not currently being utilised. The project is expected to be able to obtain the necessary water from various sources including purchasing existing allocations or negotiating with freehold landholders who are expected to receive allocations in the coming months.

Rehabilitation

Rehabilitation will be undertaken progressively as areas which have been disturbed for mining or services are no longer required.

Rehabilitation will commence in the third year of operations and will continue for the life of the operation. At the completion of operations and decommissioning of the mining and processing equipment all remaining areas in a disturbed condition will be rehabilitated.

The rehabilitation process will include:

- Shaping the surface of the disturbed areas with earthmoving equipment to remove any abrupt features and create a land surface suitable for spreading soil and seed, and removing features that may be prone to wind erosion.
- Covering the shaped surface with subsoil that was removed when the area was originally cleared for mining activities.
- Covering the subsoil with topsoil and remnants of vegetation that were removed from the surface when the area was cleared.
- Spreading seed on the topsoil and providing wind protection where necessary to minimise wind damage to the surface of the soil and seedlings.
- Where necessary planting seedlings of specific species that do not germinate as desired. A plant nursery will be used to produce seedlings of specific species from seed collected before vegetation clearing commences.

The final elevation of the rehabilitated surface will be lower than the original surface in areas that have been mined. The reduction in elevation will be similar to the depth of sand removed for processing.

Product Logistics

The low iron silica product will initially be exported to customers in China. There are no available port facilities with surplus ship loading capability close to Galalar and the current most economic method for loading the product onto a ship is transhipping at Cooktown.

Current State Government policy does not permit bulk transhipment in the GBRMP but it does allow transhipment of containerised or packaged products.

Diatreme is currently engaged in a process with stakeholders and Government agencies to seek approval for bulk transhipping through the Cooktown Port and is being supported by Hope Vale Congress and both Cook Shire and Hope Vale Shire Councils. The current logistics strategy for the project is to export the product as a bulk commodity from the mine site to the Cooktown barge loading facility (BLF) by truck, and from the BLF to a ship by barge.

The BLF is tentatively planned to be located beside the Marton boat ramp on the Endeavour River. Diatreme has discussed this proposal with officers of the Cook Shire Council and discussions are continuing around the possibility of Diatreme leasing approximately one hectare of land on the northern side of the boat ramp from the council for the BLF.

The Cook Shire Council has a standard load limit of 42.5t gross for trucks. Double road trains with 50t loads can be used if two kilometres of council road is upgraded to the relevant standard. Double road trains can be used on Hope Vale Shire Council bypass road and the roads connecting to Galalar and Cooktown. The trucks will operate 12 hours per day and mainly during daylight to minimise noise and light impacts.

The silica product will be loaded onto double road trains at the mine site for transport by road to the BLF at Cooktown. The project will include construction of a BLF near the Marton boat ramp at Cooktown. The BLF will include barge mooring piles in the river, equipment for loading bulk silica product onto the barge, and a concrete floor large enough to store 25,000 tonnes of product.

Each road train will carry 50 tonnes of product. The trucks will transport the product approximately 63km to the Cooktown BLF travelling via the Hope Vale heavy vehicle by-pass, then along the Endeavour Valley Road, Starke Street and Slaughter Yard Road to the BLF. 2,100 tonnes (42 double road trains) of bulk product will be transported from the mine to Cooktown daily for 360 days of the year. The round-trip time for a truck will be approximately 2.5 hours, allowing each truck to complete five loads per day.

Nine side-tipping double road trains will be required for the road transport logistics. The trucks will deliver the product to a concrete floor at the BLF and a front-end loader stack the product in the storage compound. The storage pad will have a capacity of 25,000t which will allow shipments up to 35,000t due to the duration of the transhipping which allows delivery of an additional 10,000t to the BLF. The minimum shipment size is expected to be 15,000t.

The Endeavour River is suitable for 70m barges with maximum loads up to 2,000t at peak tides. The barging operation will be scheduled for loaded barges to travel at high tide. Risks that need to be managed include shallow sand banks and general boat traffic.

Details of the proposed barging and transhipping system are:

- two barge loads to the ship every day
- barges will travel 10km to a moored ship just outside the Cooktown Port limits
- one way travel time for the barge is 1 hour
- the ship will use on board cranes to unload the barge
- barge loading time is 10 hours and transhipping time is 10 hours
- approximately 3,700t will be transhipped per day
- the marine vessel requirement is two 70m barges, two shallow draft tugs, two assist tugs and a crew transfer vessel.

A transhipping roadstead will be required outside the Cooktown Port limits because the port area is too shallow to fully load a handysize ship.

Approval from the Harbourmaster will be required for a roadstead and discussions with officers of the Department of Main Roads and Transport indicate the proposed operation would comply with the Sustainable Ports Act 2015 and would require an exemption from the State Government's Transhipping Policy to allow transhipping of a bulk commodity.

Shipping

The proposed maximum shipment size is 35,000t, of which 25,000t will have been stockpiled at the BLF when ship loading commences and the other 10,000t will be delivered to the BLF during the 10 day ship loading period. The production target of 750,000t of final product per year will require a 35,000t shipment every 16.8 days, which is 21.4 shipments per year.

A shipping agent will be engaged for the project and will manage the ship scheduling and cargo documentation.

Personnel

The project will not require a site camp and employees and contractors will be accommodated in the Cooktown and Hope Vale areas where there are adequate facilities for the workforce. A bus will be used during construction to reduce the number of vehicles travelling on the road from Hope Vale to the construction site. Private and company vehicles will be used for transport during operations.

The average workforce requirement for the 6 to 8 month project construction period is expected to be in the order of 30 to 40 persons. There will be three separate construction sites:

- Mine site
- Barge loading site
- Road upgrade site.

The construction workforce for the product logistics system will be estimated when full details of the system are finalised.

The mine site workforce requirement for the initial operating phase will include:

- Mine manager
- Office administrator
- Logistics administrator
- Production superintendent
- 2 x Laboratory technicians
- 4 x Shift supervisors
- 4 x Machine operators
- 12 x Process operators.

The land transport component will require nine truck drivers and two loader operators, and the BLF-transhipping component will require approximately 25 personnel.

The initial full-time workforce for the mine site will be approximately 26 which excludes short term contractors and others not based at the mine site. Electrical and mechanical contractors will provide maintenance services as required.

The market for low iron silica is expected to continue growing and additional employees will be required to increase the production rate in line with market demand.

Market and Pricing

Low iron silica sand is the raw material used for manufacturing low iron, high clarity glass products with iron oxide content less than 100 ppm.

The solar panel manufacturing industry is now a major market for low iron silica sand. Other uses for high clarity glass include optical glass, aquariums, display cases, automotive glass, some windows, and other applications where high clarity is desired. There are currently no direct substitutes for glass manufactured from low iron silica in the majority of applications.

The quality of low iron silica sand from Galalar is compared in the table below with the average specification by Chinese manufacturers of photo-voltaic glass for use in solar panels.

PARAMETER	CHINA SPECIFICATION	GALALAR QUALITY
Particle size distribution	109-700 microns (24-140 mesh)	109-700 microns 98% in range
SiO_2	99.5%	99.7%
Fe_2O_3	100ppm	85ppm
TiO_2	400ppm	140ppm
Al_2O_3	1000ppm	500ppm

Table 12: Photovoltaic glass specification and Galalar comparison

The Galalar product quality presented in this comparison is taken from the BDRI report on a bulk sample processed in China using the processing flowsheet that is planned for Galalar.

Galalar product quality for this bulk sample exceeds the Chinese specification for low-iron photovoltaic sand and provides confidence that the Galalar mineral resource will provide the production target used in this scoping study. The production target is 15 years of mining at a rate of 950,000t per year for a total of 14.25mt of sand mined, which is 66% of the Indicated Mineral Resource (21.5mt).

China is a large market for low iron silica sand and consumed approximately 6-9mt for solar panel production in 2018. Low iron silica is now in short supply and the demand is expanding rapidly. IMARC forecasts the global silica sand market to expand at a compound annual growth rate of 7.2% through to 2022, with revenues reaching close to $10 billion (Figure13).

Diatreme has engaged with several Chinese companies involved in supplying low iron silica to glass manufacturers and also directly with glass manufacturers.

Diatreme has signed a Memorandum of Understanding with Anhui Fengsha Mining Group and has been approached by Wan Zhong Investment Co Ltd regarding the supply of low iron silica into China.

The consensus understanding of pricing for low iron silica for export to China is generally in the range of US$70 to US$80 per tonne (average US$75) FOB at a port in northern and western Australia.

Revenue

The average estimated average price for low iron silica sand suitable for solar panel production is US$75 per tonne FOB Cooktown. The range of possible prices is from US$63 to US$86 per tonne and these prices have been used in the sensitivity analysis.

A long-term exchange rate of 0.70 (USD:AUD) has been used in financial modelling. The annual production of 750,000t per year would have a value of US$56.25 million (A$80.36 million).

The revenue used in financial modelling for this study is based on estimates using information available from processors and potential customers in China. Diatreme does not have any sales agreements in place due to the early stage of development of this project.

Dollar values used in this report are Australian dollars (AUD) unless specifically identified as US dollars (USD).

Cost Estimation

Capital and operating costs for the scoping study have been estimated based on currently available information and are presented in Table 13. A description of each cost component is provided following the cost estimate table.

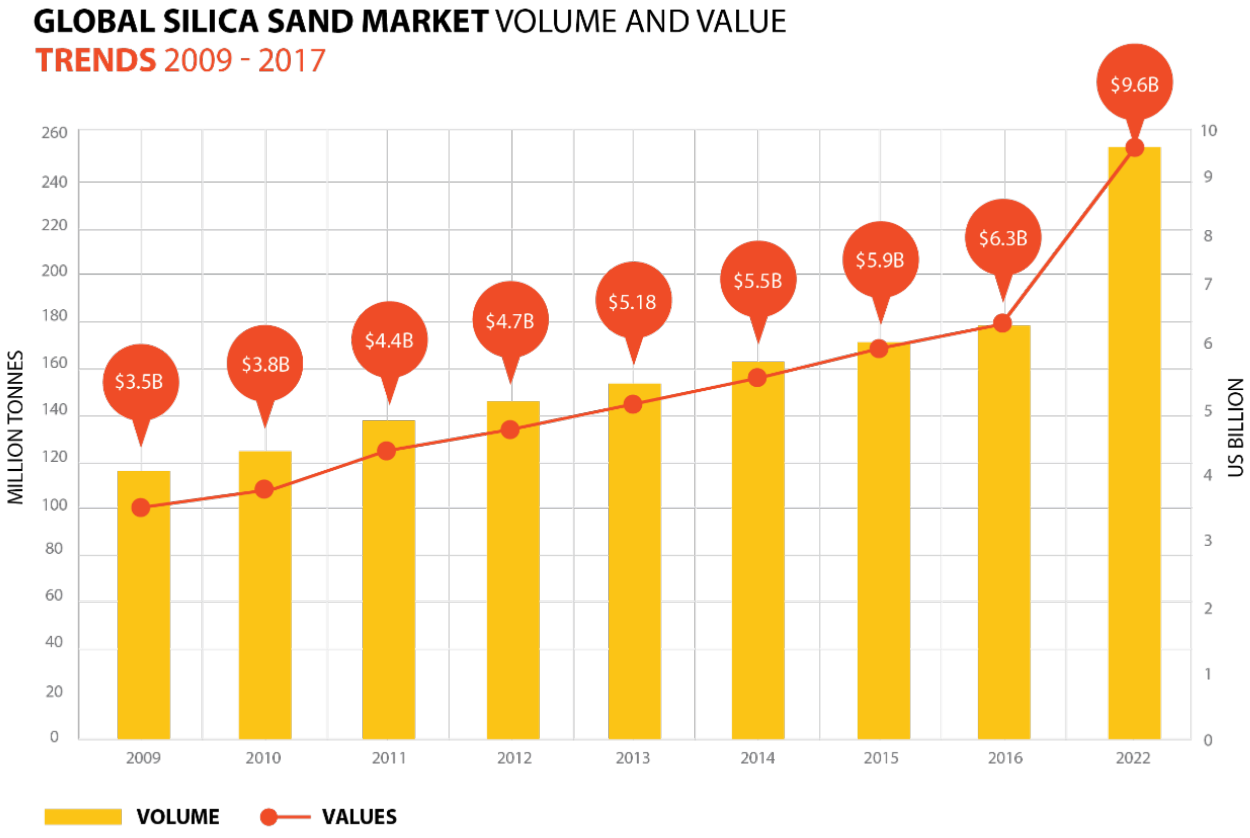


Figure 13: Global growth in the silica sand market

GALALAR PROJECT 750,000 TPA COST ESTIMATION			
ITEM	DETAILS	$ (AUD) CAPITAL	$ (AUD)/year OPERATING
Prepare mine, plant & barge sites	Mine site civil works	250,000	0
	Upgrade road to Cooktown	1,750,000	750,000
	Cooktown barge loading facility	5,000,000	250,000
	Endeavour river channel	100,000	0
Clear, prepare mining area	200kW earthmoving equipment 4hr/day	contractor	288,000
Corporate overheads	Management, marketing, planning, accounting	N/A	500,000
Drilling and assaying	2000m/year, $50/m	N/A	100,000
Laboratory	Drill and product assays, grade control & quality control	500,000	300,000
Employees	26 FTE x 120,000	NA	3,120,000
Mining	200kW endloader 20hr/day 950,000t @ $1.20/t	contractor	1,140,000
Generators & power supply system	750kW diesel generator 24hr/day 100kW solar PV system	750,000	1,500,000 + maintenance
Water supply	Bores fitted with submersible pumps and diesel generator	500,000	150,000 + maintenance
In-pit plant feed system	Grizzly, hopper, belt feeder, trommel, slurry transport system	500,000	+ maintenance
Processing plant, offices, workshops, amenities	150tph wet spiral plant with attritioning, classifying & magnetic separation	10,000,000	+ maintenance
Plant civil services	Bulldozer + endloader, pipes, tailings, services (4hr/day)	Contractor	600,000
Freight	Construction & operating	200,000	75,000
Maintenance	Parts & contractors 10% of fixed plant capital	Contractor	1,175,000
Rehabilitation	Bulldozer + endloader 5hr/day	Contractor	500,000
Truck loading	200kW endloader, $1/t	Contractor	750,000
Trucking	$14/t	Contractor	10,500,000
Barging & transhipping	BLF + transhipping barge $20/t	Contractor	15,000,000
Ship loading	Ships cranes $2/t	Contractor	1,500,000
Contingency	25% on capital, 10% on operating	4,887,500	3,819,800
TOTAL		**$24,437,500**	**$42,017,800**

Table 13: Estimated capital and operating costs

A description of cost estimates follows:

- Mine site civil works is a lump sum allowance of $250,000 for earthworks and excavations required to prepare the mine site area for construction work.
- Upgrade road to Cooktown is an estimate based on discussions with a local road contractor and an inspection of the current state of the road. The estimated cost for upgrading the road for double road trains is $1.25m for 35km in the Hope Vale Shire, $200,000 for minor work on 26km of State road, and $300,000 for 2km of road upgrade in the Cook Shire. The total estimated cost for road upgrades is $1.75m. More details of this estimate are included in Table 14. $750,000 per year has been included as a cash cost for road maintenance which is likely to be required under Road Use Agreements with the Shires and the State and is estimated as one dollar per tonne transported by truck.
- Cooktown BLF and Endeavour River channel estimates are allowances based on available information from other similar facilities.
- Clearing the mining area includes clearing vegetation and removing surface soil to expose the white sand. The average clearing rate is estimated to be 4 hectares per year and an allowance of 4 x 200kW machine hours per day has been included for this activity. Using $200 per hour per machine the annual cost estimate is $288,000.
- An allowance of $500,000 per year has been assumed for Diatreme's corporate overheads relating to the project.
- Drilling and assaying for production planning and grade control are estimated to be 2,000m per year at a cost of $50 per metre for a total annual cost of $100,000.
- Laboratory costs include capital costs for a laboratory with capability for heavy liquid separation, attritioning, classification, magnetic separation and assaying equipment for low iron silica samples. A capital allowance of $500,000 is included for the laboratory and $300,000 per year is included as laboratory operating costs including independent laboratory assays.
- The number of full-time employees is estimated to be 26. Assuming an average annual cost of $120,000 (including on-costs) across all categories, the annual cost for full-time employees is $3.12 million.
- A contractor will be engaged to mine the sand using a front-end loader at 138 tonnes per hour, 19.2 hours per day, and 360 days per year. Mining will require a 200kW end-loader and the estimated cost is $1.20 per tonne or $166 per hour.
- Power supply capital includes $600,000 for a 1,000kW diesel generator and $150,000 for a 100kW solar PV system. The estimated annual operating cost is $1,500,000 assuming an average load of kw on the diesel generator. An additional cost is included for maintenance of the generator and solar system.
- The water supply for the operation is estimated to be 500 megalitres per year or 20 litres per second. Assuming four groundwater bores with connecting pipeline are required, the estimated capital cost is $500,000 with an annual operating cost of $150,000. An additional cost is included for maintenance.
- The in-pit plant feed system will include a grizzly, hopper, belt feeder, trommel and slurry transport system. The estimated capital cost is $500,000. The plant feed system will be electrically powered and an additional operating cost is included for maintenance.
- The wet processing plant will include spirals, attritioners, classifiers and magnetic separators. The estimated capital cost is $10m and the plant will be electrically powered. An additional operating cost is included for maintenance. Details of this estimate are provided in Table 15.
- A contractor's bulldozer and end-loader will be required for approximately four hours per day for mine and plant civil services. The estimated annual cost for this activity is $600,000 per year.
- Freight cost for delivery of goods and materials to site are estimated to be $200,000 for construction and $75,000 per year during operations.

- Maintenance for power supply, water supply, plant feed system and wet processing plant has been estimated as 10% of the capital value and totals $1.175m per year. Freight cost for delivery of goods and materials to site are estimated to be $200,000 for construction and $75,000 per year during operations.

- Maintenance for power supply, water supply, plant feed system and wet processing plant has been estimated as 10% of the capital value and totals $1.175m per year.

- Rehabilitation includes allowance for a contractor's bulldozer and end-loader for 5 hours per day at an estimated cost of $400,000 per year to shape the surface and replace soil and vegetation. $100,000 per year has been included for purchasing seed and seedlings.

- The bulk product will be loaded onto trucks by an end-loader. The estimated cost for truck loading is $1 per tonne or $750,000 per year.

- The truck transport cost from the Galalar site to the Cooktown BLF is estimated to be $14 per tonne. This is a rate of 22 cents per tonne per kilometre for the 63 kilometre trip and is based on current contractor rates in the Cooktown and Hope Vale areas. The annual trucking cost will be approximately $10,500,000.

- Barge loading and barge transport are estimated to cost $20 per tonne with an annual cost of $15,000,000.

- Ship loading is estimated to cost $2 per tonne ($1.5m/year). This cost includes ship cranes, and costs associated with the roadstead close to the Cooktown Port limit.

- The cost for shipping from Cooktown to China is estimated to be US$15 per tonne based on current shipping prices for sand from southern WA to China. This study uses the FOB silica price and the shipping cost will be paid by the customer.

Details of the cost estimate to upgrade the road from Galalar to Cooktown are provided in Table 14.

Item	Cost ($AUD)
Hope Vale Shire Roads	
Site access road: 0.8km new road	150,000
Creek crossing	100,000
Site access to Elim Road: 7.67km gravel road upgrade	200,000
Elim Road gravel section: 6.38km upgrade	200,000
2 crossings	150,000
Elim Road sealed section: 8.47km bitumen edge works	50,000
Airstrip north gravel: 1.63km gravel upgrade	100,000
Banana Farm red road: 2.19km gravel upgrade	250,000
McIvor River sealed road: 7.55km bitumen edge works	50,000
Queensland State Road	
Endeavour Valley Road: 26.16km sealed road repairs	200,000
Cook Shire Roads	
Starke Street and Slaughter Yard Road: 1.75km	300,000
Total road upgrade capital cost estimate (62.6km, sealed 43.93km, gravel 18.67km)	**$1,750,000**

Table 14: Capital cost estimate for Galalar-Cooktown road upgrade

A summary of the capital cost estimate for the processing plant is provided in Table 15. The cost details have been extracted from reports by Mineral Technologies and IHCR to produce a total processing plant capital cost estimate showing major component costs.

Cost estimates have been rounded up to reduce the risk of underestimating the capital cost and for consideration of the preliminary nature of the process design. A capital cost allowance of $10m for the processing plant was used in the financial evaluation.

Processing Plant Component	Estimated Capital Cost ($AUD)
Trommel	100,000
Spiral separators	400,000
Attritioner cells	350,000
Up current classifiers	500,000
Wet high intensity magnetic separators	1,800,000
Process slurry pumps	350,000
Process water pumps	120,000
Dewatering hydrocyclones	230,000
Distributors & launders	150,000
Piping & valves	350,000
Instrumentation, meters, switchrooms	500,000
Foundations, structures, platework (materials)	1,500,000
Construction (mechanical & electrical)	1,800,000
Offices, workshops, amenities	300,000
Engineering, procurement, construction management	1,500,000
TOTAL	$9,950,000

Table 15: Processing plant capital cost estimate

Queensland State Royalty at a rate of $0.90 per tonne of product has been included as a cash cost in the financial model. For the production rate of 750,000 tonnes per year the annual State Royalty payable is $675,000.

Due to the early stage of the project, a Mining Agreement has not been finalised with the traditional owners and freehold landowners. A nominal royalty of 1% of revenue has been included as a cash cost for the project and Diatreme believes this appropriate given the relevant discussions and negotiations to date.

Forecast Financial Information

A financial model has been developed by Diatreme for an initial assessment of the viability of the project. Parameters used in the model are:

- Exchange rate USD:AUD = 0.70
- Discount rate 10%
- Period of evaluation 15 years
- Annual production target 750,000t
- Product price US$75 p/t (AU$107)
- Capital cost $24.4m
- Annual operating cost $42m
- State royalty 90c p/t
- Hope Vale royalty 1% of revenue

The pre-tax results of the preliminary financial evaluation are approximately:

- Net Present Value $231 million (AUD)
- Internal Rate of Return 150%
- Payback period 0.7 years

Additional estimated financial information obtained from the financial evaluation is presented in Table 16 (Cost and revenue estimates) and Table 17 (Unit cost per tonne estimates).

Financial Estimate	($AUD)
Revenue/year (AUD '000)	80,357
Cash costs/year (AUD '000)	43,496
Cash margin/year (AUD '000)	36,861
Cash cost/t product (AUD)	58.00

Table 16: Cost and revenue estimates

Cost Area	Unit Cost ($AUD/t)
Mine site operations	$2.70
Processing	$9.23
Truck transport	$16.00
BLF & Transhipping	$22.33
Overheads, royalties, contingency	$7.73

Table 17: Estimated unit cost per tonne of final product

Sensitivity analysis has been performed on pre-tax NPV. Model inputs were flexed between a range of +/-15% stated here and Fig 14 states +/- 10% increments (Table 18).

Model inputs	-15%	-10%	-5%	Base	+5%	+10%	+15%
Silica price	148	176	203	231	258	286	313
Production tonnes	149	176	204	231	258	286	313

Model inputs	+15%	+10%	+5%	Base	-5%	-10%	-15%
Exchange rate	159	181	205	231	260	292	328
Operating cash costs	186	201	216	231	246	261	276

Table 18: Pre-tax NPV sensitivity against base case

Model inputs	7%	Base (10%)	13%
Discount rate	289	231	188

Table 19: Pre-tax NPV sensitivity against base case discount rate

The tornado chart highlights the sensitivity of pre-tax NPV at -10% and +10% of financial model inputs against the A$231m base case scenario.

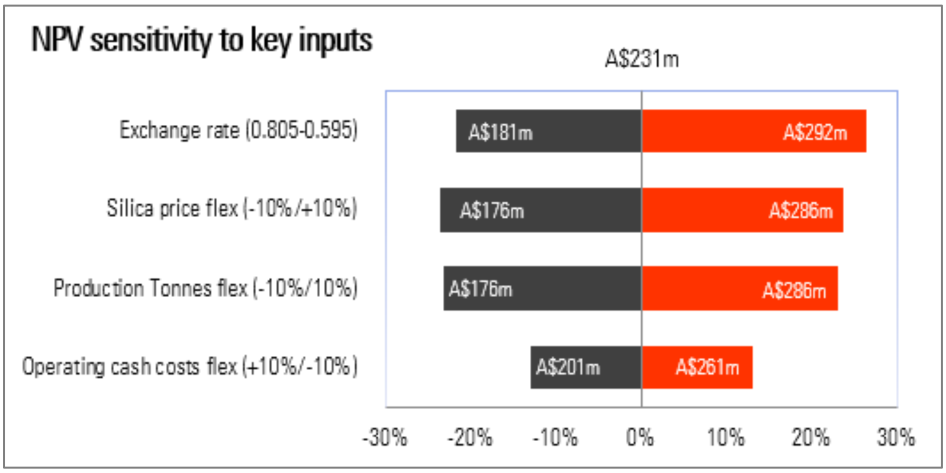


Figure 14: Pre-tax NPV sensitivity

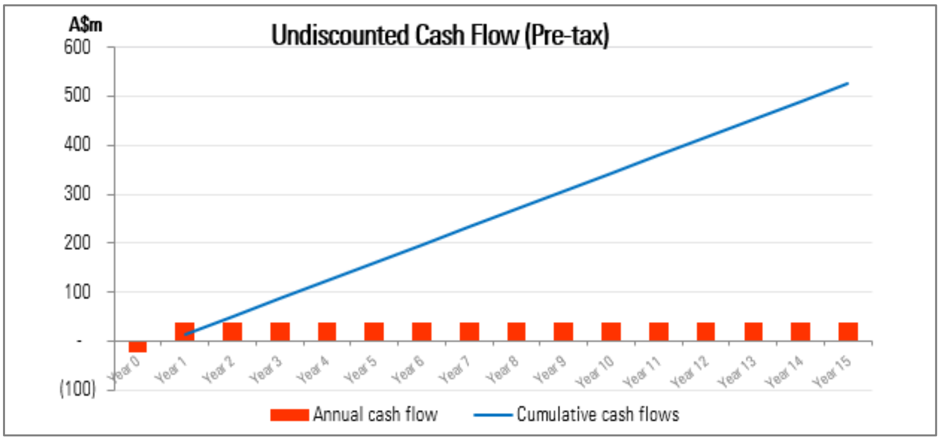


Figure 15: Life of mine undiscounted cash flow

Future Technical Studies

Future technical studies will be completed as part of a feasibility study program to support an investment decision by Diatreme's Board of Directors.

The additional studies will include:

- Measured and Indicated Resources based on additional drilling.
- Capital and operating cost estimates to +/-15% accuracy.
- Finalised logistics system
- Proved and Probable Ore Reserves
- Mine plan and mining schedule
- Project implementation plan
- Feasibility Study.

Development Timeframe

The positive forecast financial information presented in this Scoping Study and the forecast strength of the market for low iron silica sand has given Diatreme confidence to expedite the development of this project.

Diatreme expects a further period of 15-18 months to the establishment of possible mining operations as the Company is now undertaking the required detailed permitting and approvals process leading to the grant of a mining lease and establishment of actual on-site operations.

Concurrently the Company is also undertaking the requisite detailed commercial studies and complete feasibility study to establish the project's viability.

Project Funding

As the expected total CAPEX of the project is relatively low in mining development terms the Company would expect to fund the project's development through a combination of direct fund raising through share issuances in Diatreme, supported by existing and potentially new shareholders and through the sourcing of an appropriate level of project debt from external lenders. The Company could also seek to bring in development partners to fund the project's implementation by selling down a portion of the project.

Project Delivery Schedule

The target project delivery schedule is shown in Table 20 below:

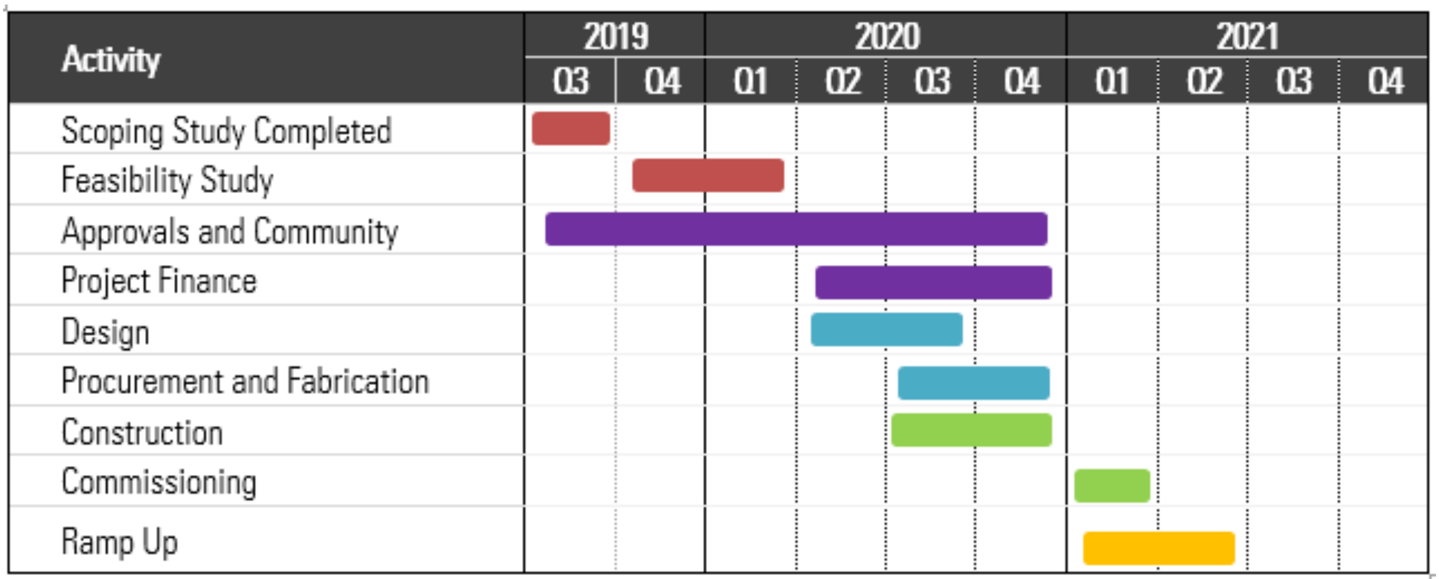


Table 20: Target project delivery schedule

JORC Code, 2012 Edition – Table 1 Report – Galalar Silica Project Indicated and Updated Inferred Resource Estimate.

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	• Drilling samples range from 1m-3m down hole intervals of air-core drill cuttings collected from cyclone mounted rotary splitter, approximately 3-4kg (representing approximately 20% of drill material returned via the cyclone is sampled). • Sample was submitted to commercial laboratory for drying, splitting (if required), pulverization in tungsten carbide bowl, and XRF analysis. • Sampling techniques are mineral sands "industry standard" for dry beach sands with low levels of induration and slime. • As the targeted mineralization is silica sand, geological logging of the drill material is a primary method for identifying 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 in to large plastic samples bags.
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• Vertical NQ air-core drilling utlising blade bit, initially 3m runs were used for drilling campaigns in (September 2017, October 2017, April 2018 and June 2018) which was decreased to 1m increments the most recent drilling campaign (November/December 2018). Within the resource estimate there is 75 drillholes of which (1m increment 30 holes, 3m increment 45 holes). • Holes were terminated in a clay layer or when the water table 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*	• Visual assessment and logging of sample recovery and sample quality. • Reaming of hole and clearance of drill string after every 3m rod. • Sample chute cleaned between samples and regular cleaning of cyclone to prevent sample contamination.

Criteria	JORC Code explanation	Commentary
	and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	• No sample bias occurred between sample recovery and grade.
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	• Geological logging of the total hole by field geologist, with retention of sample in chip trays to allow subsequent re-interpretation of data if required. • The total hole is logged initially at 3m intervals which was decreased to 1m; logging includes qualitative descriptions of colour, grain size, sorting, induration and estimates of HM, slimes and oversize utlising panning. • Logging has been captured through field drill log sheets and transferred through to an excel spreadsheet 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.*	• Drilling samples rotary split on site (Approximately 20% subsample), resulting in approximately 3 – 4kg of dry sample. • Sample was coned and quartered to generate a 1-2kg sample for submission to the laboratory, with surplus retained as a reference sample. • Sample size (3kg - 4kg) is considered appropriate for the grain size of material, average grain size (87% material by weight between 0.125mm and 0.5mm).
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.*	• Drilling samples were submitted to ALS Townsville, where they were dried, weighed and split. • Analysis was undertaken by ALS Brisbane utilising a Tungsten Carbide pulverization, ME-XRF26 (whole rock by Fusion/XRF) and ME-GRA05 (H_2O/LOI by TGA furnace). • Samples were assayed for SiO_2 and a range of heavy and other elements. • Analysis undertaken determined by a sample code which correlates to drill logs to ensure no sample bias. • Metallurgical samples were submitted to IHC Robbins for characterization testwork (screening, de-sliming, sizing, HLS and XRF analysis) and wet-tabling (two stage).

Criteria	JORC Code explanation	Commentary
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• Significant intersections validated against geological logging and local geology/ geological model. • 12 holes were twinned with sampling and logging undertaken in 1m increments which were used to validate the 3m sample and drill increments that have been previously completed. • All data captured and stored in both hard copy and electronic format. • No assay data had to be adjusted.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• All holes initially located using handheld GPS with an accuracy of 5m for X, Y. • UTM coordinates, Zone 55L, GDA94 datum. • Contract registered surveyor from Veris Ltd used a differential GPS to pick up drillhole Easting, Northing and Elevation values for holes within the resource area. • Topographic surface generated from processing Stereo WorldView -3 satellite imagery and DGPS control points, collar RL's leveled against this surface to ensure consistency in the database.
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 lines were completed at approximately 100m spacing along the prepared access tracks, with holes drilled at approximately 75m along the lines. • Drill spacing, and distribution is sufficient to allow valid interpretation of geological and grade continuity for an Inferred Mineral Resource and an Indicated Mineral Resource where specified.
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• The dune field has ridges dominantly trending 320° - 330°. • The drill access tracks typically run along or sub-parallel to dune ridges which suggest unbiased sampling, some cross-dune tracks linking the ridges were also drilled. • Silica deposition occurs as windblown with angle of rest approximately 35° (Nob Point East). Drilling orientation is appropriate for the nature of deposition.
Sample security	• *The measures taken to ensure sample security.*	• Sample collection and transport from the field was undertaken by company personnel following company procedures. • Samples were put into plastic bags, which were labelled and put into canvas sample bags and sealed prior to being sent off to ALS Townsville. • Samples were delivered direct to ALS in Townsville.
Audits or	• *The results of any audits or reviews of sampling techniques and data.*	• The updated Inferred Resource Estimate is based on updated

Criteria	JORC Code explanation	Commentary
reviews		geological and geochemical data which were used to validate and audit the original Inferred Resource Estimate. • Reviews were conducted internally by Diatreme Ltd and third-party consultants Ausrocks Pty Ltd. And they were found to be consistent.

Section 2 Reporting of Exploration Results

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

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	• The Galalar Silica Project occurs within EPM17795 in Queensland and is held by Diatreme Resources Ltd. It should be noted that previously this project has been referred to as Cape Bedford Silica Project. The name of the project was changed to reflect the land owner agreement with the Hopevale Congress Aboriginal Corporation in 2018. • The tenement is in good standing. • A compensation and conduct agreement along with a cultural heritage agreement is in place with the landholder and native title party (Hopevale Congress).
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Previous exploration has been carried out in the area during the 1970's by Ocean Mining and 1980's by Breen Organisation. • The historical exploration data is of limited use 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 dune deposits associated with Quaternary age sand-dune complex. • Mineralisation occurs within aeolian dune sands.
Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* o *easting and northing of the drill hole collar* o *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* o *dip and azimuth of the hole* o *down hole length and interception depth* o *hole length.* • *If the exclusion of this information is justified on the basis that the*	• A tabulation of the material drill holes is attached to this JORC Table 1, as required by the Table 3.1.

Criteria	JORC Code explanation	Commentary
	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 (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• Downhole compositing of samples using weighed averages of Silica content and interval length to determine floor and ceiling of material that exceeded 99% SiO_2 content. • No minimum or maximum grade truncations have been used. • The grade is highly consistent, and the aggregate intercepts use a simple arithmetic average.
Relationship between mineralisation widths and intercept lengths	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* • *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	• As the mineralisation is associated with aeolian dune sands the majority sub-horizontal, some variability will be apparent on dune edges and faces.
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• A map of the drill collar locations is incorporated with the main body of the report. Representative cross-sections have been attached within the main body of this 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.*	• Geological observations are consistent with aeolian dune mineralisation. • Groundwater was intersected during drilling at the base of holes, as expected given the dune complex is an aquifer and drilling was undertaken to considerable depth. • The mineralisation is unconsolidated sand. • IHC Robins 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. • (CNBM) Bengbu Design & Research Institute for Glass Industry Co., Ltd December 2018 completed bulk (0.35t) laboratory sample to determine the viability of the product as high value glass product

Criteria	JORC Code explanation	Commentary
		which resulted in 78% recovery of a >99% SiO^2 raw sample to 99.9% SiO^2. • There are no known deleterious substances. • 1100 $\%SiO_2$ assays were completed on downhole composites over various drilling programs.
Further work	• *The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• The areas of possible extensions are to the north and east of the existing resource boundary which is constrained based on drilling data. Area's to the west (west of Alligator Creek) have shown potential. • Additional drillholes that have been detailed in the conclusion of the report should be completed as part of the next campaign of drilling.

Section 3 Estimation and Reporting of Mineral Resources

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

Criteria	JORC Code explanation	Commentary
Database integrity	• *Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* • *Data validation procedures used.*	• The database was originally constructed by Diatreme Resources and provided to Ausrocks in various file formats. Ausrocks reformatted these databases into appropriate file formats checking that assay results matched the documents provided from the respective laboratories and the logs aligned with the chip tray samples.
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.*	• No site visits have been undertaken by the Competent Person, but Ausrocks Pty Ltd representative (Mining Engineer/SURPAC Modeller) has visited the site as a quality assurance/quality control exercise. • Each drillhole was logged, sampled, photographed and kept in chip trays. The photographs and chip trays were investigated by the competent person to verify the previous logs.
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 Indicated and Inferred Resource Estimate was calculated for a bulk mining operation where all material between two surfaces will be extracted and processed. The current drill hole spacing with the currently available analytical testing is sufficient to identify a large volume of sand which could be processed to produce a high-grade silica sand product.

Criteria	JORC Code explanation	Commentary
Dimensions	• *The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	• The resource boundary that has been formed is approximately 2.0km in length and 700m at its widest point at East Nob Point and 650m in length and 400m at it's widest point at West Nob Point. • Nob Point East the top of the resource predominantly following the topography, the top of the resource at its highest point is 45.8 mRL to the lowest at 20.4mRL. Depths to the resource depth range from 0.3m to 12m with an average depth of 1.1m. Nob Point West also had the top of the resource follow the topography the resource at its highest point is 48m with a low of 19.3m. • The base of the resource at East Nob Point ranges from 35.9mRL to 6.8mRL. The surface is relatively flat with a variation of 29.1m over 2,000m of strike. West Nob Point the base ranges from 38mRL to 17.5mRL, which has a 20.5m change in elevation over the 650m strike. • Average thickness of the resource within the boundary is 16.7m at East Nob Point and 12.7m at West Nob Point.
Estimation and modelling techniques	• *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.* • *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* • *The assumptions made regarding recovery of by-products.* • *Estimation of deleterious elements or other non-grade variables of economic significance (eg Sulphur for acid mine drainage characterisation).* • *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.* • *Any assumptions behind modelling of selective mining units.* • *Any assumptions about correlation between variables.* • *Description of how the geological interpretation was used to control the 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*	• The resource layers were determined using an inverse distance analysis to the power of 2. With a 50m by 20m grid spacing with the major axis aligning with the dune orientation at 330°. Minimum amount of holes that influenced interpolation were 3 with a distance of interpolation set to 250m. To determine the resource boundary, the top and bottom layers were intersected with the topography surface. • Check estimate completed through changing of grid orientation and spacing when modelling the deposit. • No deleterious elements were detected during the testing which was compiled. • No block modelling was completed as part of this resource estimate. • Grade cutting or capping was not applicable as no SiO_2 values exceeded 100%. • There was an assumption that an increase in AlO_2 levels and moisture content indicated that the base material was clay, which indicated that this is the bottom of the hole and this was excluded from the resource estimate. • The base and the top of the resource we determined by the silica assays completed on the 3m intervals originally and from the most recent drilling program this is in 1m intervals. The maximum amount of material was classified as product that could be blended to ensure the grade was in excess of 99% silica. These heights were loaded

Criteria	JORC Code explanation	Commentary
	available.	into SURPAC 6.6.1 and modelled using an inverse distance interpolation technique.
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 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 Townsville.
Cut-off parameters	• *The basis of the adopted cut-off grade(s) or quality parameters applied.*	• A cut-off grade of 99% silica was used to classify the Indicated and Inferred Resource Estimate.
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 a truck/shovel or dozer push to conveyor mining method would be selected subject to additional reviews which the deposit size does not constrain either of these methods. The resource was also limited to above the water table to make both of these mining methods plausible. • Dilution was not considered in the resource estimate. In some holes there was additional resource below the >99% 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 resource estimate as it is assumed that this would be a soil and vegetation layer and would be scalped when mining the deposit.
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.*	• Down hole sample compositing was undertaken to generate a single bulk sample for holes CB037, CB038, CBO047, CB048, CB053 and CB054 was completed as part of the exploration target with infill drilling and samples on downhole composites completed for the Inferred Resource. • It is assumed that the feed material for the proposed processing plant be in excess to 99% SiO_2. IHC Robins 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. • (CNBM) Bengbu Design & Research Institute for Glass Industry Co., Ltd December 2018 completed another 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. • As this is an Inferred Resource estimate no metallurgical factors were considered in the resource calculation, with the bulk testing showing

Criteria	JORC Code explanation	Commentary
		that >99% SiO_2 raw feed material is a suitable cut-off grade to produce a 99.9% SiO_2 processed material.
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 minimal tailings produced through processing and thus minimal disposal. • Environmentally sensitive areas have been excluded from the resource area. • There is a 50m offset either side of Alligator Creek which bisects East Nob Point and West Nob Point.
Bulk density	• *Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* • *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* • *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	• 55 density samples have been undertaken on site using a Dormer Push Tube. The in-situ density of 1.62 t/m^3 was an average of the samples across the deposit and was used to calculated the Indicated and Inferred Resource estimate. Both are reported as in-situ densities with the natural moisture profile not yet determined, with further testing required to determine the dry density if/when the resource is taken to a JORC compliant reserve. Bulk Density sampling procedure and data can be found in Appendix D of this report.
Classification	• *The basis for the classification of the Mineral Resources into varying confidence categories.* • *Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* • *Whether the result appropriately reflects the Competent Person's view of the deposit.*	• The deposit has an Inferred Resource Estimate of 8.7Mt and an Indicated Estimate of 21.5Mt. • The most recent drilling campaign using 1m increments for logging and sampling through the continuity of the twinned holes to those previously drilled in 3m increments shows an appropriate correlation. Over 1,100 geochemistry samples have been taken to accurately show correlation between drillholes. • 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.*	• This updated Inferred Resource Estimate and a maiden Indicated Resource Estimate. The Inferred Resource Estimate, which has been completed by separate competent persons and reviewed internally by Ausrocks Pty Ltd.
Discussion of relative	• *Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach*	• It is the opinion of the competent person that the relative accuracy and confidence level in both the Inferred and Indicated Resource

Criteria	JORC Code explanation	Commentary
accuracy/ confidence	*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.*	Estimate is adequate, given the drill density and continuity of geochemical samples. • The Inferred and Indicated Resource boundary is tightly constrained based on the drill density. • 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.