AUSTRALIAN
RESEARCH
INDEPENDENT INVESTMENT RESEARCH

Diatreme Resources Limited

(ASX: DRX)

December 2023

INDEPENDENT
INVESTMENT RESEARCH

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Contents

INDEPENDENT INVESTMENT RESEARCH

Diatreme Resources Limited (ASX: DRX)

Initiation - December 2023

Note: This report is based on information provided by the company as at 13 December 2023

Investment Profile	
Share Price as at 13 Dec 2023	A$0.025
2 month L/H	$0.020/$0.033
Per Share Valuation	A$0.074
Issued Capital:	
Ordinary Shares	3,730 m
Unlisted Options	70 m
Fully Diluted	3,800 m
Market Capitalisation	A$93.24 m
Cash Position	
DRX Cash as at 30/9/23	A$11.9 m
JV Cash as at 30/9/23	A$5.9 m
Subsequent JV Receipts	A$24.0 m

Board and Management
Mr Wayne Swan: Chairman
Gregory Starr: Non-Executive Director
Michael Chapman: Non-Executive Director
William Wang: Non-Executive Director
Kara Keys: Non-Executive Director
Neil McIntyre: Chief Executive Officer
Tuan Do: CFO and Company Secretary

Major Shareholders	
Ilwella (Flannery Family Office)	21.04%
Sibelco	19.27%
DELPHI	10.30%
Board and Management	0.5%
Top 20	69.9%

Share Price Performance

The investment opinion in this report is current as at the date of publication. Investors and advisers should be aware that over time the circumstances of the issuer and/or product may change which may affect our investment opinion.

SILICA SAND - VITAL FOR THE DECARBONISED FUTURE

One of the key elements of the drive towards the decarbonisation of the global economy, and the use of renewable energy, is solar power. In 2022 the International Energy Agency ("IEA") forecast that by 2027 installed solar generation capacity (both distributed and grid-scale) could more than double to over 3,000 GW globally from the actual 2022 figures of 1,183 GW, overtaking all other forms of electricity generation.

Extrapolating growth out to 2030 indicates a total installed solar panel capacity of between 4,000 and 5,000 GW, with annual production of between 500 GW and 700 GW of photovoltaic ("PV") panels, compared to 236 GW in 2022, with China currently producing ~80%, and the broader Asia region over 90%.

One of the key ingredients of solar panels is photovoltaic ("PV") glass, with a usage intensity of around 50 kg per kW or 50,000 tonnes per GW. The major component, at ~72%, of the glass is high purity silica sand ("HPSS"), with the above forecasts indicating that the annual demand for HPSS could grow from the current ~8 Mtpa to 26 Mtpa by 2030.

This is expected to lead to a supply crunch, with Diatreme Resources ("Diatreme" or "the "Company") ideally placed to enter the market. Diatreme is the 73.2% owner of the Northern Silica Project ("NSP"), with Sibelco, a multinational industrial minerals company holding the balance, having made a total A$48 million investment at the corporate and project level, with the Project now funded through to any decision to mine.

Diatreme has recently completed a robust Scoping Study on the NSP, based on a 25 year mine life, producing 3 Mtpa of HPSS for two years, and then 5 Mtpa for 23 years from 2026 and delivering an after tax NPV of A$829 million. This is a base case, with current resources and exploration targets having the capacity to supply a multi-decade operation. Metallurgical test work has shown that the product can meet the stringent quality requirements for this sector of the sand markets.

The NSP is located at Cape Flattery in Far North Queensland ("FNQ"), adjacent to Mitsubishi's current Cape Flattery Sands ("CFS") operations, which currently produces at ~3 Mtpa, and which is exported through a gazetted port adjacent to the mining and processing area. Although looking to develop their own facilities adjacent to, and then on the existing jetty, there may be the potential for infrastructure sharing with Mitsubishi.

Given that silica sand is a bulk commodity, being located next to an export facility is a significant positive for the Project, given that FOB transport costs can significantly affect the economics of bulk projects. Secondly, being in an area of existing mining should be a positive as far as permitting and stakeholder engagement is concerned.

In addition to the NSP, Diatreme has the nearby Galalar Silica Project ("GSP") and adjacent exploration targets that have the potential to significantly add to any future mining inventory. It also holds the Cyclone heavy mineral sands project in Western Australia, and the Clermont Copper Project in Queensland, with the latter being farmed out.

We have a risked base case valuation for Diatreme of A$0.074/share, with A$0.042 being attributable to Diatreme's equity share in the NSP - Diatreme's unrisked equity share of the NSP is A$0.21/share.

We see upside to this valuation with ongoing activities (which include a current PFS and then DFS), and material advances in technical aspects, permitting and stakeholder, including Traditional Owner, negotiations.

KEY POINTS

Robust, high margin project : The Scoping Study has delivered a robust, high margin project, that is ideally placed to deliver into the forecast supply deficit in HPSS for photovoltaic glass.

Prime location: Being next to an existing port and a similar mining operation should have significant benefits, including costs, permitting and stakeholder engagement amongst others.

Delivering into the "green" economy: Solar power is one of the planks of the decarbonising economy and net zero aspirations - being part of that industry should give the NSP good green credentials.

Key cornerstones and major partner: Diatreme has a strong register with sticky investors, including the development partner, Sibelco.

Supportive government: The Queensland Government has introduced a critical minerals strategy, with the potential for Cape Flattery to become a "silica hub".

Strong news flow: We expect strong and steady newsflow going forward.

SWOT ANALYSIS

Strengths

- **Robust project in the right location:** The Scoping Study has delivered a robust, relatively technically simple, long term project, with significant upside potential, being located next to an existing mining project and export port facility.
- **Large resources and exploration targets:** Work to date has defined resources, and exploration targets that should readily be converted to resources, that have the potential to feed a multi-decade operation.
- **HPSS supply deficits forecast:** Given the forecast take-up of solar panels as part of the decarbonising economy, over 90% of which are produced in traditional Australian export markets, Diatreme is ideally placed to deliver into the PV HPSS markets.
- **Metallurgy:** Work to date has indicated the suitability of the sands to be processed to meet the stringent physical and chemical requirements for sands to be used in PV glass.
- **Strong cash position, funded through to a final investment decision:** With total cash of ~A$40 million, both the JV and Diatreme are well funded, with Diatreme buffered from the capital markets until at least well into 2025. At the JV level, the ~A$30 million should take the Project through to the FID.
- **Key partner and strong register:** Key investors, including the development partner Sibelco are very supportive, with this in part being demonstrated through buying on market subsequent to the last placement in 2022.
- **Supportive Government:** The Queensland Government is supportive of critical minerals projects, and as such has set up a Critical Minerals Strategy, including the provision of "hubs". In addition, the NSP has been recognised as a project of regional significance.
- **Proven mining destination:** Queensland has a strong and recognised mining industry, and was ranked 13th globally in the 2022 Fraser Industry survey of mining companies. This flows onto required services and skills being readily available.
- **Experienced people with the necessary expertise:** Company personnel have the requisite skills to drive development.

Weaknesses

- **Location:** Although located next to an existing mine, the location, close to the FNQ wet tropics coast, and on aboriginal freehold land, may cause complexities and delays in permitting, as well as attracting adverse publicity from external parties.

Opportunities

- **Port access:** Although the Scoping Study is predicated on the Company constructing its own port and loading facilities, there may be the opportunity to access Mitsubishi's infrastructure, thus saving costs (potentially up to A$150 million) and time, including in permitting.
- **Resource expansion:** This work is currently underway, and the growth in resources can provide flexibility in any mining operation - there is the potential to define resources significantly larger than those required to supply any foreseeable operation.
- **Other markets:** Although the PV HPSS market has been targeted, there may be the potential to supply other markets, including the foundry sand and other glass markets - although products are generally of lower value, these could still provide acceptable margins on increased throughput.

Threats

- **Permitting:** Given the location, and land ownership, permitting is the key risk; however in our view this relates more to timing and delays in approvals, rather than the project not being permitted.
- **Metallurgy, consistent mineralisation:** The specialist industrial minerals markets require the supply of consistently in-spec product over a long time period - the Company needs to ensure consistency in the resource over a large tonnage, and a metallurgical flowsheet to effectively treat the run of mine ("ROM") material.
- **Prices and markets:** These are constant threats to resource companies, and will affect the ability to raise capital - although expected capital requirements are modest in the short term, Diatreme will be looking to raise development capital in the medium term, with project capital markets still being tight.

OVERVIEW

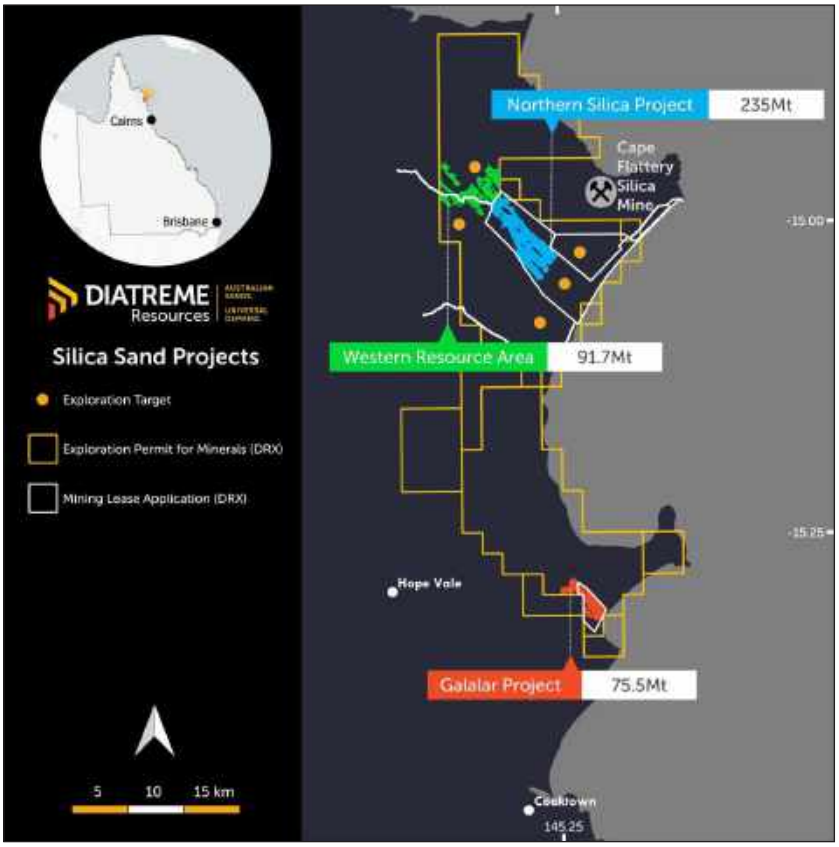
STRATEGY AND PROJECT OVERVIEW

- Diatreme's focus is on the appraisal and development of high purity silica sand properties, located near Cape Flattery in Far North Queensland ("FNQ", Figures 1 and 2).
- Current activities are concentrated on the 235 Mt Northern Silica Project ("NSP"), for which a positive Scoping Study has recently been completed.
- The Company is now working on a Pre-Feasibility Study ("PFS"), expected to be completed in H1, 2024, which will then lead into a Definitive Feasibility Study ("DFS", Figure 3).
- All going well, the Company, and 26.8% JV partner, Sibelco, are looking to first shipments towards the end of 2026 (Figure 3), ideally timed to feed into forecast strong deficits in the HPSS markets, a vital component in PV glass used in solar panels.

Figure 1: Diatreme project location map

Source: Diatreme

Figure 2: Far North Queensland tenements



Source: Diatreme

Figure 3: Northern Silica development timeline

Source: Diatreme

- Also in FNQ is the 75.5 Mt Galalar Silica Sands Project ("GSP"), for which activities were largely concentrated until late 2022, when the Si2 silica sand discovery, which forms the basis of the NSP, was made.
- The GSP is more problematic as regards permitting and hence development, being located some 40 km south of the existing Cape Flattery operations of Mitsubishi (and the NSP), and attracting opposition from some Traditional Owner's ("TO").
- Development of the GSP would either require a completely new port, or else as more recently investigated by the Company, ~40 km haulage to the existing port at Cape Flattery.
- Either way, there would be potential issues with several groups and organisations, including, amongst others, the TOs, Great Barrier Reef Marine Park ("GBRMP") and the public that uses the beaches in the vicinity of Cape Bedford.
- Notwithstanding the above, the metallurgical process designed for the GSP has been used as the basis of that for the NSP.
- Diatreme has two other projects which will not be discussed further - the Cyclone mineral sands deposit in Western Australia, for which options are being considered, including attracting a development partner or listing it separately in a spin out amongst others, and the Clermont Copper/Gold Project in Central Queensland, for which a staged farm-out agreement has been entered into with Metallica Minerals (ASX: MLM, "Metallica").
- Metallica has now earned 25% of Clermont through the expenditure of A$300 k, with the option to go to 51% (an additional A$700 k) and then 75% (an additional A$1 million), at which stage Diatreme has the option to co-contribute, else dilute to a royalty.

SIBELCO PARTNERSHIP

- On June 27, 2022, Diatreme announced that it had entered into a partnership with Sibelco, a multinational industrial minerals company with operations in over 30 countries, and with a workforce of over 5000.
- Main mined and processed products include silica for the glass and foundry sectors, olivine and clays, with Sibelco also being a globally significant global glass recycler.
- In 2022 Sibelco generated an EBITDA of €339 million and FOCF of €161 million from revenues of €2,009 million.
- The partnership included a project level investment of A$35 million, and a placement into Diatreme of A$14 million at A$0.025/share.
- The project level investment is in two tranches (with both being received), with the funds expected to last until the completion of project financing and a decision to mine:
  - An initial payment of A$11 million, to earn 10% of an after money valuation of A$110 million; and,
  - A second tranche of A$24 million, based on taking ownership to 26.8% on an after money valuation of A$160 million.

FINANCIAL POSITION

- As of September 30, 2023, the Company had A$11.87 million in cash, and cash of A$5.90 million in the Northern Silica JV, which received the first A$11 million instalment of the Sibelco investment in the December 2022 Quarter.

- Subsequent to the end of the quarter Sibelco paid the 2nd, A$24 million tranche of the investment as announced to the market on October 17, 2023 - this was paid prior to the previously agreed December timing, resulting in cash as of September 30 plus the second tranche of close to $30 million in the JV, less any subsequent expenditure.
- The last capital raising was a combined A$17.29 million placement to Sibelco and Ilwella (the Brian Flannery family office) at A$0.025/share in June/August 2022 - this included 559.47 million shares for A$13.99 million to Sibelco, and 132.11 million shares for A$3.30 million to Ilwella.
- Over the 12 months to September 2023 the Company spent A$2.14 million on exploration and evaluation, with these costs for the NSP then passing to the JV, which has spent a further A$5.1 million - ongoing silica sand project costs will now all be borne by the JV funds.
- Over the same period A$2.22 million was spent on staff and administration.

CAPITAL STRUCTURE

- Diatreme currently has 3,730 million shares and 70 million unlisted options on issue, with all options being out of the money - they have exercise prices of between A$0.025 and A$0.045 (with a weighted average of A$0.033), and expiry dates of between 8/8/24 and 25/7/28.
- The Company has a strong register, with the Top 3 holding 50.61% - these include Ilwella (Flannery Family Office, 21.04%), Sibelco (19.27%), and Delphi and associated funds (10.30%).
- Both Ilwella and Sibelco have bought on market since the 2022 placement
- The top 20 hold 69.9%, with insiders holding 0.5%.

CURRENT AND UPCOMING ACTIVITIES

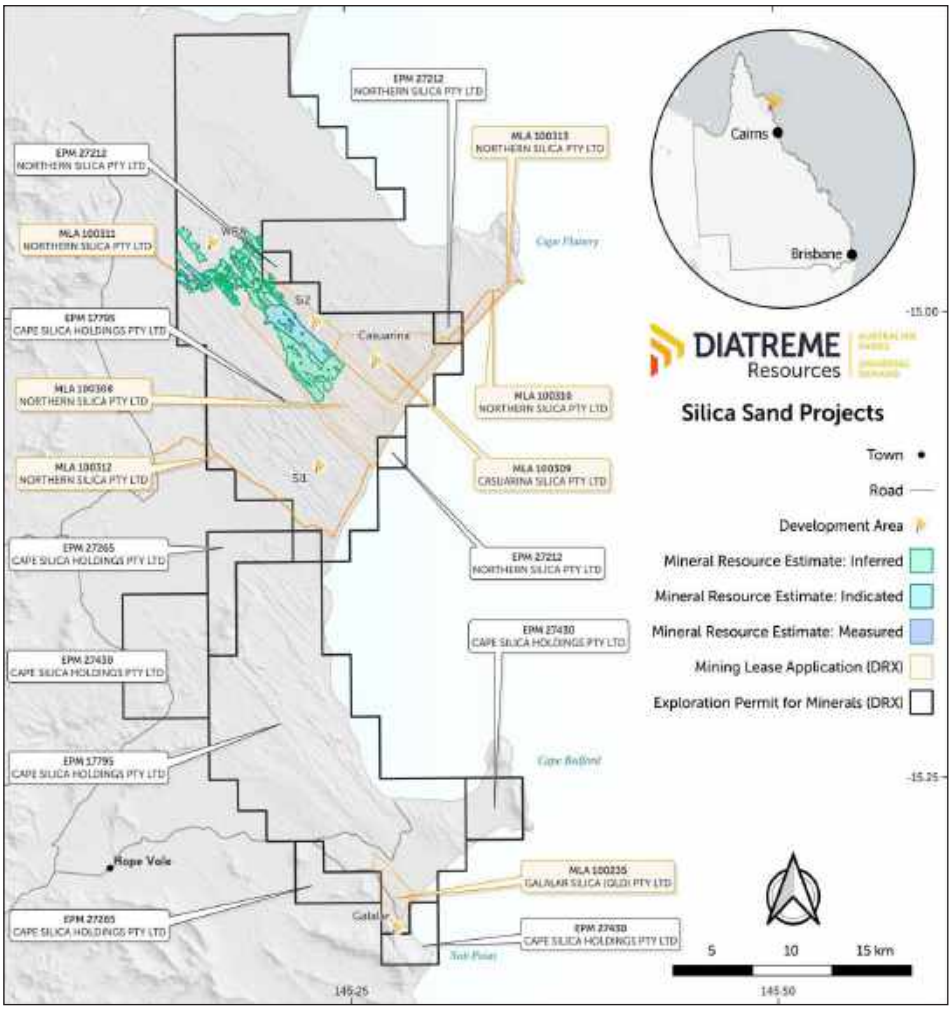
- Diatreme has active work programmes underway at the Queensland Silica Projects, with these concentrated on advancing the NSP, and additional work on the Exploration Targets to upgrade them to at least Inferred Resources.
- At the NSP, activities include:
  - Ongoing dialogue with the Traditional Owners, working towards the establishment of a mining project agreement,
  - Ongoing dialogue with other stakeholders, including government agencies and departments,
  - Awarding tenders for various aspects of the EIS, and continuing on with EIS related activities,
  - Infill drilling to allow for the upgrade of Resources, as well to accurately assess the continuity of domains that can be used for processing to HPSS; and,
  - Bulk metallurgical testwork, to assess the amenability of the GSP process route to the NSP.
- The Company has been undertaking additional drilling at the PLT and WDR exploration targets (Figure 4), with this work to be used in initial Mineral Resource Estimates ("MRE") for these areas.
- These are contiguous with the existing Si2 resource, and form part of overall resource expansion, and hence future project scope, activities.
- With regards to Cyclone, the Company is continuing to assess develop opportunities, including holding discussions with potential development partners.
- Another option may be to spin out Cyclone into a new listed vehicle.

QUEENSLAND SILICA PROJECTS - DIATREME 73.2%

LOCATION AND TENURE

- Diatreme's Queensland silica projects include the 73.2% owned Northern Silica and Galalar Silica Projects, (Figures 2 to 4) along with other earlier stage areas that Exploration Targets have been assessed for.
- Until late 2022 activities were focussed on Galalar, however, following the discovery of significant high grade silica sand Resources near Cape Flattery, the focus has moved to the Northern Silica Project.
- The project areas include four granted Exploration Permits - Minerals ("EPM") and seven Mining Lease Applications ("MLA") - the MLAs include those required for access roads and infrastructure corridors as well as mining and processing operations (Figure 4), with the corporate structure, including tenement ownership, shown in Figure 5.
- The granted exploration permits, which cover an area of 592 km^2 are in good standing, with the MLAs covering an area of 71 km^2.
- Neighbours include Mitsubishi's Cape Flattery Silica ("CFS") operations, and Metallica's Cape Flattery Silica Sands Project ("CFSSP").
- Although not shown on the map, the CFSSP is located in the indent in EPM 17795 to the south of the "Flattery Bay" annotation, and to the north of the CFS operations.
- Metallica completed a DFS for a 1.3 Mtpa saleable product operation July 2023, and is currently commencing the EIS process, and undertaking negotiations with the Traditional Owners.
- The closest town is Hopevale, with a population of ~1,000, around 50 km by all weather dirt roads, albeit with some access issues during the summer wet season.
- Hopevale is 46 km by sealed road from Cooktown (population ~2,800), and 370 km from Cairns (population ~ 150,000); Cooktown is served by regular flights from Cairns, and Hopevale has a 1,000 m natural surface airstrip.

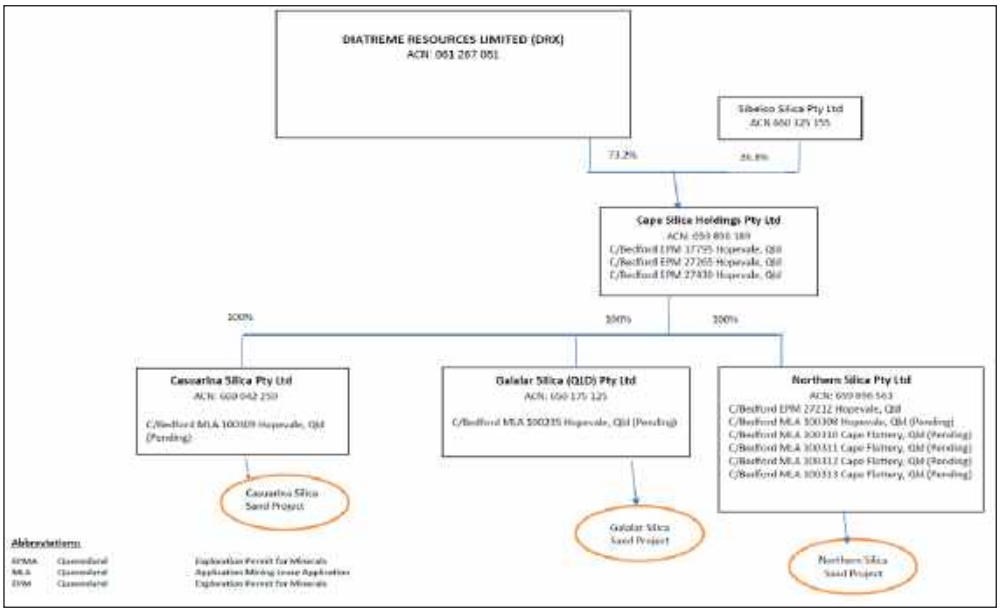
Figure 4: Queensland silica projects location and tenements



Source: Diatreme

- There is no grid power to site, however there is available groundwater, and the Company will be applying for an allocation from the 25,000 ML strategic reserve held under the Cape York Water Plan (2019).
- Other key infrastructure includes the Ports North Cape Flattery Jetty and gazetted port area (Figures 6 and 12) - the bare jetty is owned by Ports North, a Queensland Government agency, with Mitsubishi the owner of the above deck infrastructure.
- As it stands the ship loading facility has the capacity to handle 8.5 mtpa, with Mitsubishi currently utilising ~3.1 mtpa.

Figure 5: Corporate structure



Source: Diatreme

Figure 6: Ports North jetty and Mitsubishi ship-loader

Source: Diatreme

PERMITTING, STAKEHOLDER ENGAGEMENT AND FINANCING

- Given the location of the Project, and land ownership, in our view stakeholder engagement and permitting are the keys to the successful development of the Project.

Traditional Owners and Agreements

- The projects are located within the Hopevale Aboriginal Shire, comprising freehold Aboriginal land held by the Hopevale Congress Aboriginal Corporation (a Registered Native Title Body Corporate, "RNTBC") in trust for the Traditional Owners.

- The region is the home to several clans of Traditional Owners, with these represented by the Hopevale Congress Aboriginal Corporation, Walmbaar Aboriginal Corporation (an RNTBC) and the Darrba Land Trust.
- The latter holds Aboriginal Freehold next to the Hopevale Congress's tenure, which will be impacted by the northern access route.
- In 2016 and 2017 the Company signed a "Conduct and Compensation Agreement" and a "Cultural Heritage Assessment Agreement" with the Hopevale Congress Aboriginal Corporation, which allows for the undertaking of exploration and assessment programmes.
- The Company is continuing to negotiate mining agreements with the relevant parties.
- Diatreme, which maintains its operations office in Hopevale, recognises the critical nature of developing strong relationships with the local population and maintaining their rights, as well as using the planned operations to bring social and financial benefits to the region, including employment, training and cultural preservation amongst others.
- These factors are outlined in Company presentations and other public documents, and are reinforced by the recently announced co-operation agreement with the Hope Vale Shire Council (November 20, 2023) - key point to come out of this is maintaining the balance between economic viability and community benefits, including preservation of cultural aspects.
- In our view, another key aspect on the community side is the potential for the Project to develop into a very long term operation - this results in the longer term certainty of benefits and support for the local stakeholders.

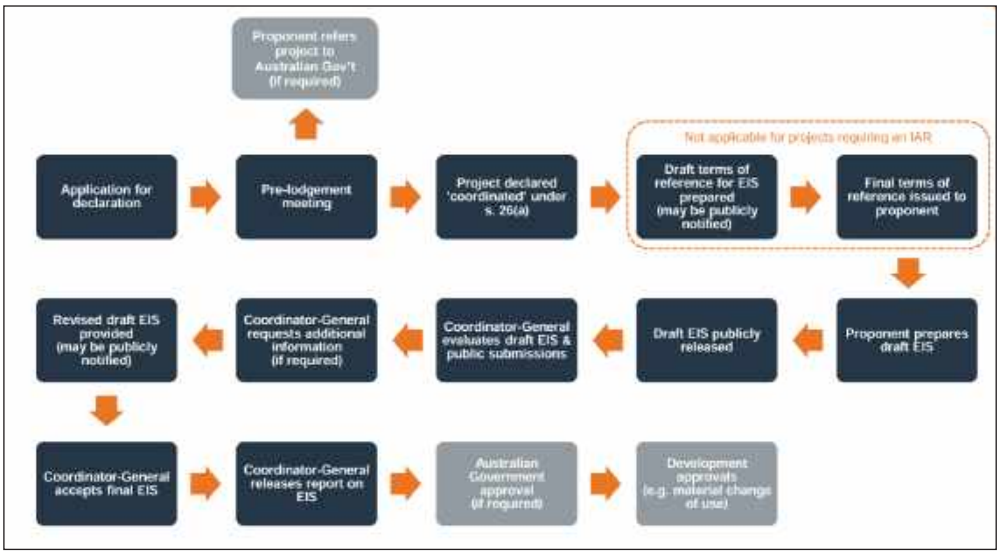
EPBC Referral, Coordinated Project Status and the EIS

- As announced by the Company on June 16, 2023, the NSP has been determined a "controlled action" under the Environmental Protection and Biodiversity Conservation Act 1999 ("EPBC") following a referral within the Federal Government Department of Climate Change, Energy, the Environment and Water ("DCCEEW").
- This decision has been made with regard to the following matters:
  - World Heritage properties,
  - National Heritage places,
  - Listed threatened species and communities; and,
  - The Great Barrier Reef Marine Park.
- The NSP will be assessed through an EIS process, with this delivered under the accredited Queensland process, and will allow the single study to address both State and Federal factors, and be reviewed by both levels of government.
- Fieldwork, including baseline data collection, for the EIS is underway, with this being undertaken in parallel with the preparation of the Initial Advice Statement ("IAS") and Terms of Reference ("ToR").
- An application has also been lodged for the Project to be treated as a "Coordinated Project" under state legislation, which, if successful, will result in the approvals stream being coordinated by the Office of the Coordinator General ("OCG") - this should simplify and streamline the overall approvals process, including that of the EIS.
- The EIS approvals stream is shown in Figure 7 - note that "IAR" refers to an impact assessment report, a more streamlined, "fit for purpose" approvals process for well defined and low to medium risk coordinated projects, and not applicable here.

Project of Regional Significance

- The NSP has been recognised as a Project of Regional Significance by the Queensland Government - this was announced to the market on August 3, 2023.
- This reinforces the positive economic and social impacts that the Project will have on the region, including employment, with the region currently having an unemployment rate in the order of 40%.
- This will also allow Diatreme to apply for a water entitlement, for the life of the Project, from the 25,000 ML of unallocated water held in the strategic reserve under Cape York's Water Plan (2019).
- The Company will need to demonstrate that the allocation will satisfy the requirements of Cape York's Water Plan (1999) and the Cape York Water Management Protocol (2019).

Figure 7: Diagrammatic EIS/IAR process



Source: Queensland Government EIS Fact Sheet, 2020

Queensland Critical Minerals Strategy

- In June 2023 the Queensland Government announced the A$245 million "Critical Minerals Strategy", which is designed to foster investment in the mining and processing of critical minerals, to drive the transition to renewable energy and meet emission targets.
- One pillar of the strategy is the identification of critical minerals hubs, of which Cape Flattery has been identified as a potential silica minerals hub - these are planned to create an open environment for all potential producers.
- The rationale behind the hubs is to focus on efficiencies in supply chains from exploration through to shipping, with aspects including, amongst others, easing access to infrastructure, and developing pathways through permitting and approvals.
- That being said, environmental, social and governance ("ESG") standards, including environmental and traditional owner aspects amongst others will not be compromised in the activities under the strategy - these are key to the successful implementation of the planned project.

Port MoU, and Working Group

- The Company has a Memorandum of Understanding ("MoU") in place with the Queensland Government owned Far North Queensland Ports Corporation ("Ports North"), the owner of Cape Flattery Port.
- The agreement outlines the key terms of co-operation, to allow for the export of silica sand through the state-owned port.
- Diatreme, Ports North and Mitsubishi have also formed a working group to negotiate and progress the potential shared use of facilities, as well as the Company's current concept of extending the existing jetty structure by 260 m.
- Although the below deck facilities are owned by Ports North, the above deck facilities are owned and operated by Mitsubishi.

Offtake and Marketing

- Having offtake agreements in place is essential to the development of the Project, including in acquiring debt funding - developing the required relationships is therefore a key aspect of the Company's activities.
- One such relationship is the Sibelco JV, with Sibelco being a major multinational producer of speciality industrial minerals, including silica, clays, feldspathics and olivine.
- Sibelco, whose activities cover the value chain from mining through to the sale of processed goods, is also a significant global glass recycler.
- As part of marketing activities, the Company has also met with several of the Chinese PV glass manufacturers (remembering that China produces some 80% of solar panels globally) and undergone a comprehensive market study as part of the development studies.
- This has also been critical for price discovery, given that silica sand prices are not published in the open markets, and are set via contracts between buyers and sellers.

- One such target company is FLAT Glass, one of the world's largest PV grade glass producers, and with which Diatreme has signed a non-binding MoU (July 13 2023).
- The MoU covers several aspects, including the exchange of samples and information, and the potential for FLAT glass to establish an onshore PV glass production facility, to supply the growing domestic uptake of solar panels.

Financing

- Although relatively early days, the Company is looking at various funding options and structures, however expects, given the strong economics and long life nature of the Project, to be able to finance its share through a traditional structured finance package, with this to be finalised by the time of the Final Investment Decision ("FID").
- The strong cornerstone investors, who have been very supportive to date, are also possible participants in any development funding.
- On the debt side, in addition to the traditional banks, there is the potential to raise funds through the Northern Australian Infrastructure Fund ("NAIF"), a Federal Government agency tasked with providing relatively low cost debt to projects that include the development of infrastructure in the remote areas of Northern Australia.
- Our experience of looking at NAIF funding is that it does concentrate on the infrastructure aspects of mining project (utilities, transport), rather than the direct operations (mining, processing).
- The "green" nature of the Project, given that it plans to supply a critical element of renewable generation, should also widen the potential sources of funding, including from "green" financiers.

GEOLOGY AND MINERALISATION

- The target silica sands are hosted in the Cape Bedford/Cape Flattery Dune field, which covers an area of some 700 km^2, and is one of several such features on the east coast of Cape York Peninsula.
- The source of the sand is believed to be Mesozoic quartz sandstones of the Gilbert River Formation and Dalrymple Sandstone to the west, with these already containing relatively pure pre-cursor material.
- At least two ages of the aeolian dunes have been recognised, with the older comprising a series of inactive and vegetated elongate NW-trending parabolic dunes, that have undergone podsolisation through the percolation of humic acid over 40,000 years, resulting in the development of a weathering/soil profile.
- The second set includes immature NE trending parallel dunes, which, in some areas have undergone some profile development.
- The dune development at the NSP can be seen in Figure 8, with the NW pointing apexes of the parabolic dunes reflecting the general SE wind direction - sections are shown in Figures 10 and 11.
- It is the upper "A" horizon that is of interest, and where impurities have been weathered out through the action of humic acid, and deposited lower in the profile in the "B" horizon.
- The B horizon is absent in places, with the A horizon resting directly on the groundwater basement - the base of the MRE is the bottom of the A horizon.
- The key parameters in defining what is "mineralisation" and what is not is the purity of the sands, and the grain size distribution - both of these are critical in determining what is marketable, and for what purposes the sands can be used for.
- For the HPSS PV glass target market, the following quality parameters are required:
  - SiO_2 >99.5%,
  - Particle size distribution of between 109 - 700 µm (24 - 140 mesh),
  - Fe_2O_3 < 120 ppm, however preferably < 100 ppm, or even 80 ppm for some markets,
  - TiO_2 < 400 ppm; and,
  - Al_2O_3 <1000 ppm.
- As can be seen in Tables 1 to 3, the ROM quality is already quite close to the required specifications, with the metallurgical processing (discussed below) being shown to produce marketable products at both Si2 and Galalar.

- One necessary aspect is for the operation to produce the required product over the life of the mine, and for any potential customer, prior to signing any offtake, to be confident that the proposed operation will deliver .
- As such the Company is taking a very stringent approach to, and using a number of different methods in sampling and choosing what to sample, to ensure consistency in quality and, importantly, accuracy and repeatability.

RESOURCES AND RESERVES

- The silica projects host three Mineral Resources (Si2, WRA and Galalar) totalling 402 Mt of silica sand, Ore Reserves of 32.53 Mt at Galalar, and Exploration Targets with a range of 250 Mt to 850 Mt @ 98.5% to 99.9% SiO_2 in the NSP area - the NSP area features are shown in Figure 4, with plans of the individual Resources shown in Figures 8 to 11.
- Resources for Si2 (2023), WRA (2023) and Galalar (2021) are shown in Tables 1 to 3, with Ore Reserves for Galalar (2021) in Table 4, and the Exploration Targets in Table 5.
- It should take only limited low cost infill drilling to upgrade Inferred to Indicated, and Indicated to Measured Resources, thus providing the confidence and flexibility in the Resources to feed into a robust PFS and DFS.
- The more recently estimated Resources for the WRA are a NW extension of those for Si2, and provide additional flexibility to any planned operation - these largely include the previously announced PLT Exploration Target.
- MRE boundaries are generally the top of the dunes (as measured by LIDAR), the base of the A horizon, the boundaries of the CFS mining areas, and incorporate a 1 km wide buffer from the shoreline.

Table 1: Si2 Deposit JORC 2012-Compliant MRE - 2023

Si2 Deposit JORC 2012-Compliant MRE - 2023										
Category	Silica Sand (Mt)	SiO_2 (%)	Fe_2O_3 (%)	TiO_2 (%)	Al_2O_3 (%)	LOI (%)	Total (%)	Silica Sand (Mm^3)	Density (t/m^3)	Cutoff Grade (SiO_2 %)
Indicated	103	99.31	0.10	0.14	0.09	0.13	99.83	65.0	1.6	98.5
Inferred	132	99.27	0.11	0.15	0.12	0.17	99.90	82.0	1.6	98.5
Total	**235**	**99.29**	**0.11**	**0.15**	**0.11**	**0.15**	**99.87**	**147.0**	**1.6**	**98.5**

Source: Diatreme

Table 2: WRA Deposit JORC 2012-Compliant MRE - 2023

WRA Deposit JORC 2012-Compliant MRE - 2023										
Category	Silica Sand (Mt)	SiO_2 (%)	Fe_2O_3 (%)	TiO_2 (%)	Al_2O_3 (%)	LOI (%)	Total (%)	Silica Sand (Mm^3)	Density (t/m^3)	Cutoff Grade (SiO_2 %)
Indicated	10.3	99.20	0.15	0.24	0.06	0.02	99.84	6.4	1.6	98.5
Inferred	81.4	99.38	0.09	0.15	0.06	0.10	99.90	50.9	1.6	98.5
Total	**91.7**	**99.36**	**0.10**	**0.16**	**0.06**	**0.09**	**99.89**	**57.3**	**1.6**	**98.5**

Source: Diatreme

Table 3: Galalar Deposit JORC 2012-Compliant MRE -2021

Galalar Deposit JORC 2012-Compliant MRE - 2021									
Category	Silica Sand (Mt)	SiO_2 (%)	Fe_2O_3 (%)	TiO_2 (%)	Al_2O_3 (%)	LOI (%)	Silica Sand (Mm^3)	Density (t/m^3)	Cutoff Grade (SiO_2 %)
Measured	43.12	99.21	0.09	0.11	0.13	0.16	26.95	1.6	98.5
Indicated	23.12	99.16	0.09	0.13	0.01	0.24	14.45	1.6	98.5
Inferred	9.22	99.10	0.11	0.16	0.11	0.27	5.76	1.6	98.5
Total	**75.46**	**99.18**	**0.09**	**0.12**	**0.12**	**0.20**	**47.16**	**1.6**	**98.5**

Source: Diatreme

Table 4: Galalar Deposit JORC 2012-Compliant Probable Ore Reserve

Galalar Deposit JORC 2012-Compliant Probable Ore Reserve									
Category	Silica Sand (Mt)	SiO_2 (%)	Fe_2O_3 (%)	TiO_2 (%)	Al_2O_3 (%)	LOI (%)	Silica Sand (Mm^3)	Density (t/m^3)	Waste (Mt)
Probable	**32.53**	**99.20**	**0.08**	**0.11**	**0.13**	**0.16**	**32.53**	**1.6**	**0.04**

Source: Diatreme

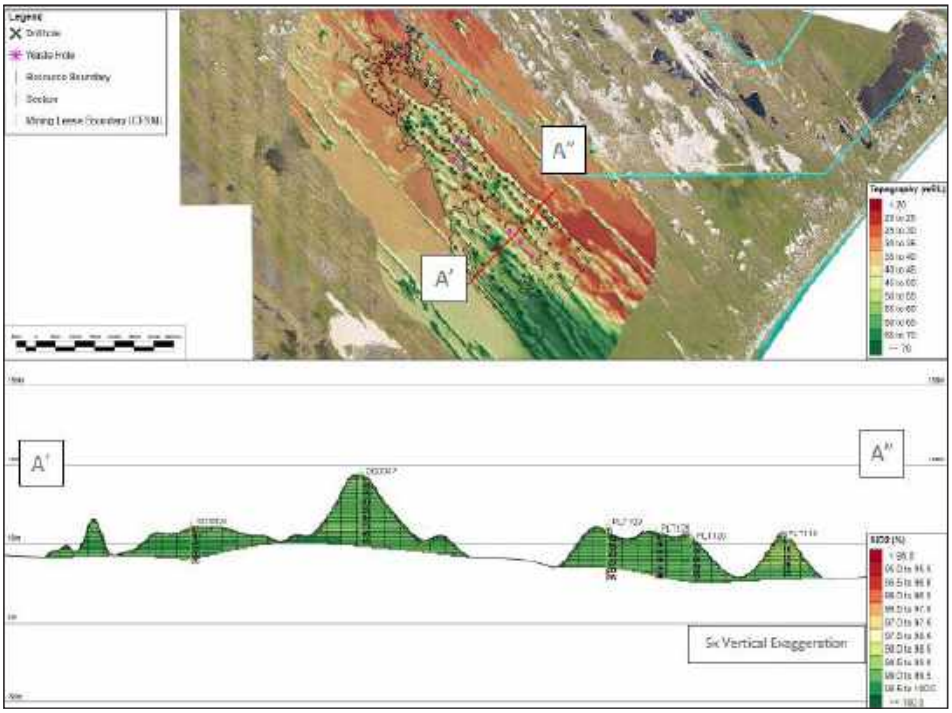
Table 5: NSP Exploration Targets - 2023

NSP Exploration Targets - 2023		
Exploration Target	**Tonnage Range**	**Grade Range**
Casuarina Silica Deposit	70 - 240 Mt	**98.5 - 99.9% SiO_2**
WDR Exploration Target	40 - 130 Mt	
Si2 Exploration Target	140 - 470 Mt	
Total	**250 Mt - 840 Mt**	

Source: Diatreme

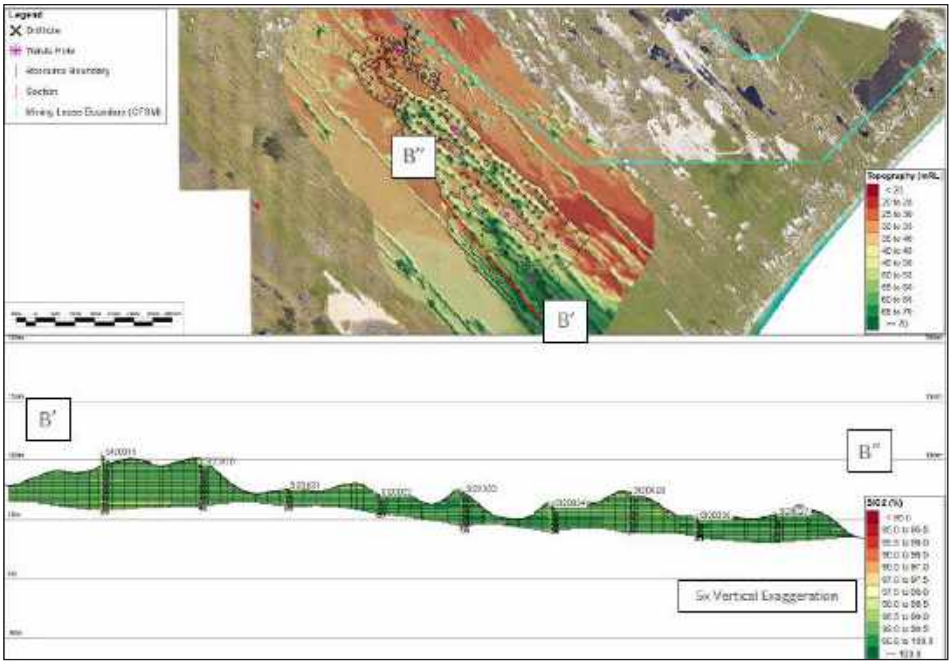
- A cross and long section for Si2 are presented in Figures 10 and 11 (note the vertical exaggerations) - this shows that the vertical extents of the mineralisation are controlled by the dune morphology, with the water table forming the base, and tops of the dunes the upper surface of the Resource.

Figure 8: Si2 deposit plan and cross section - refer to Figure 4 for location



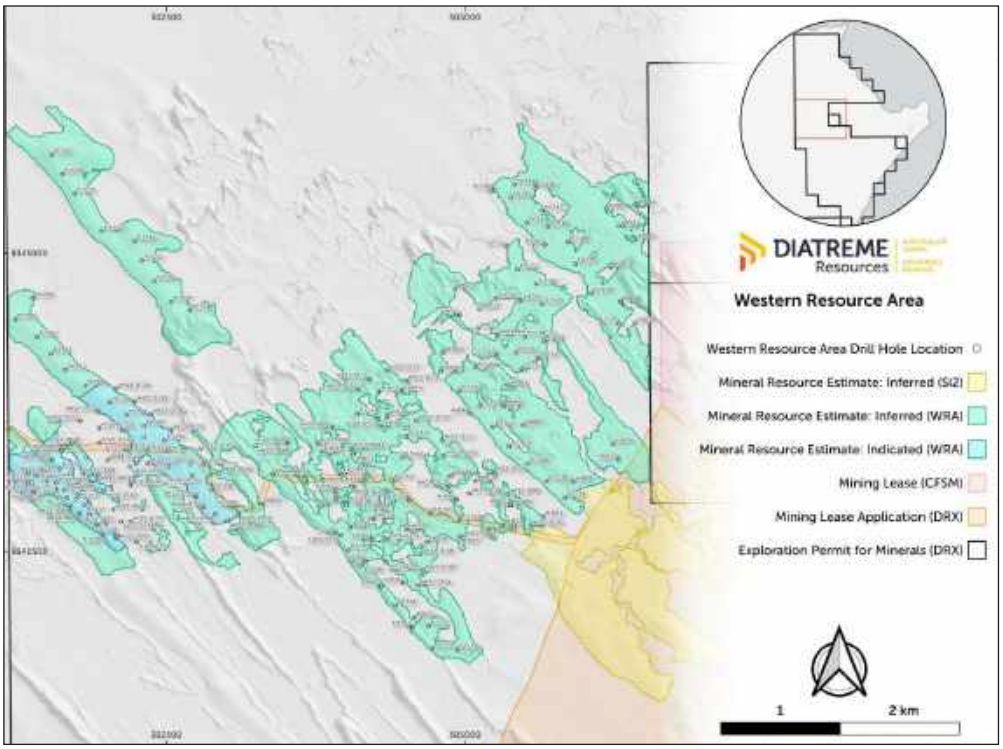
Source: Diatreme

Figure 9: Si2 deposit plan and long section - refer to Figure 4 for location



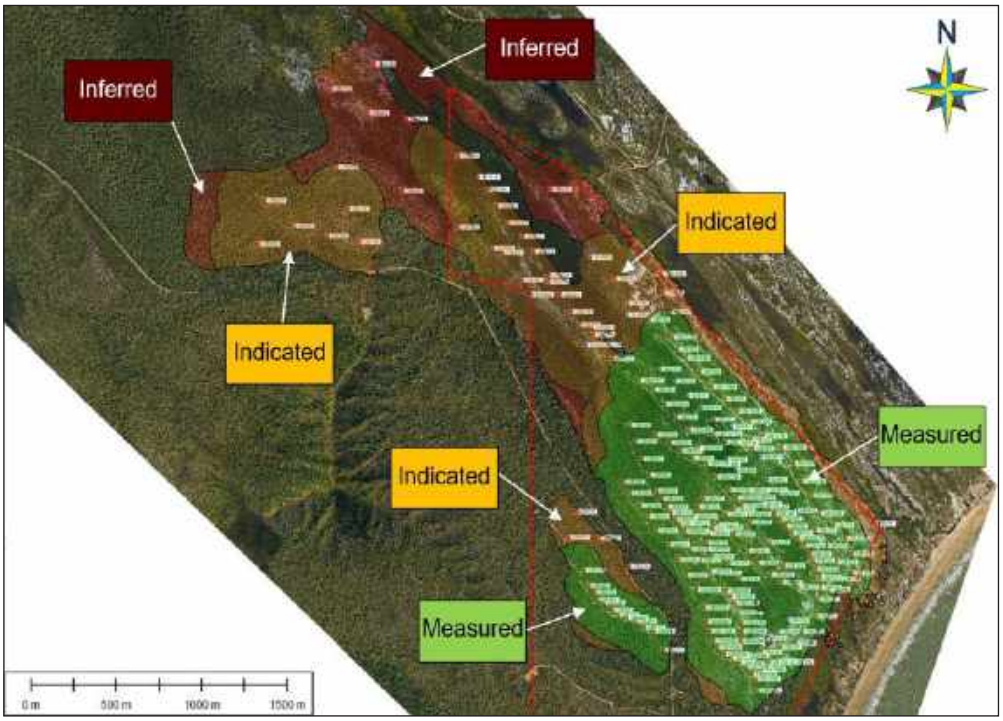
Source: Diatreme

Figure 10: WRA deposit plan - refer to Figure 4 for location



Source: Diatreme

Figure 11: Galalar deposit plan - refer to Figure 4 for location



Source: Diatreme

DEVELOPMENT STUDIES

Background

- Three development studies have thus far been completed on the silica sand projects - a 0.75 mtpa Scoping Study (9/9/19) and 1.32 mtpa PFS (9/11/21) for the GSP, and the 3 mtpa, expanding to 5 mtpa Scoping Study for the NSP, with the latter discussed in detail below.
- The GSP studies will not be discussed in detail, except that the PFS had an expected capex of A$67.9 million, and total costs of A$34/t FOB.

- Initially, the plan was to barge from a transhipment facility at Nob Point south of Cape Bedford, however this was then changed to include trucking to Cape Flattery, with transhipment from the designated Cape Flattery Port area.

NSP Scoping Study

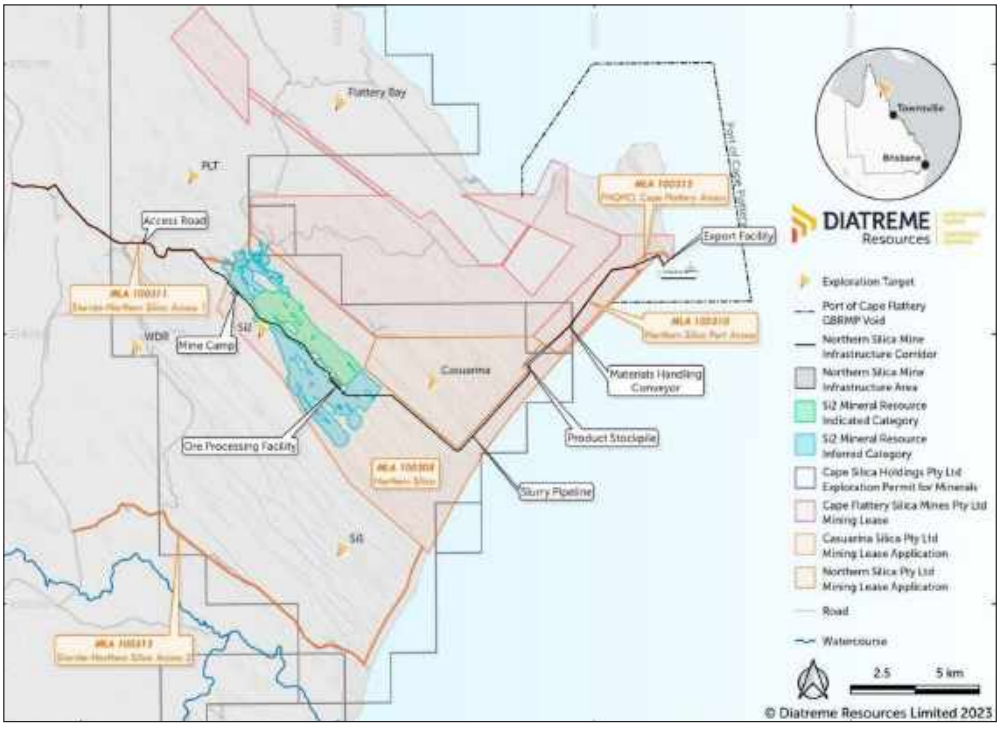
- The NSP Scoping Study was released to the market on June 14, 2023, and is based on an initial two year Phase 1 operation mining 3.75 Mtpa of sand, to produce 3.0 Mtpa of saleable HPSS, at a yield of 80%.
- This will then be followed by a 6.25 Mtpa mining operation, to produce 5 Mtpa of HPSS for a further modelled 23 years, for a total operational life of 25 years, preceded by a one year construction period - as shown in Figure 3, the target is to commence production late in CY2026.
- Key parameters are shown in Table 6, and the conceptual site layout in Figure 12

Table 6: NSP Scoping Study parameters and outcomes

NSP Scoping Study parameters and outcomes		
Item	**Unit**	**Value**
NPV (pre-tax)	A$M	1,410
IRR (pre-tax)	%	33
NPV (post-tax)	A$M	829
IRR (post-tax)	%	32
WACC	%	10
Payback Years	Years	6
Mine Life	Years	25
LOM Net Revenue	A$M	9,783
LOM Opex	A$M	2,298
LOM Sustaining Capex	A$M	180
Total Capex	A$M	535
Sales Price (FOB)	A$/t	81
Shipping and Marketing	A$/t	24
FOB Cost (C1 Costs)	A$/t	27.40
Queensland State Royalty	A$0.90/wmt silica sand sold	
Traditional Owner Royalty	Estimated 2% of project revenue on a FOB basis (to be subject to agreement)	

Source: Diatreme

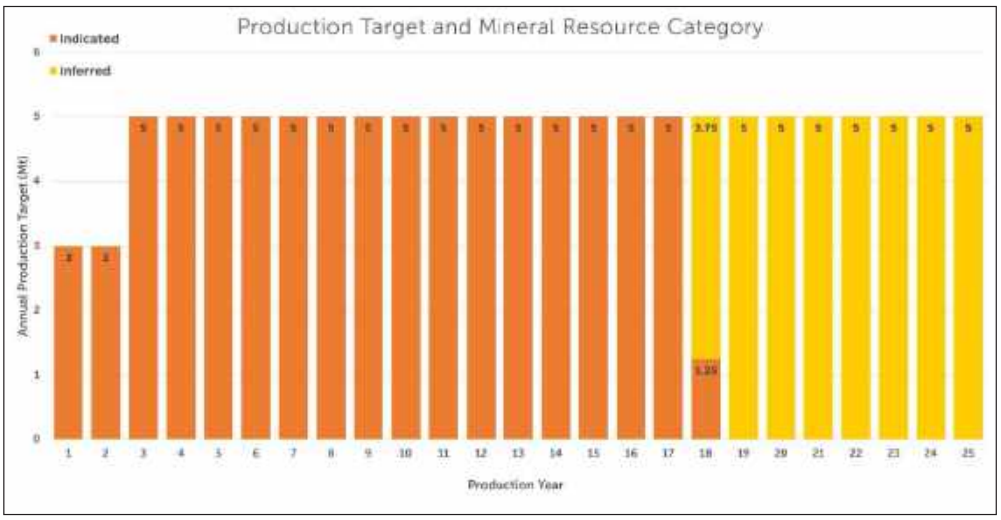
Figure 12: NSP conceptual site layout (note that the WRA is not shown here, but corresponds with PLT)



Source: Diatreme

- Figure 13 presents the modelled HPSS production and resource category - we note that this uses 32% Inferred Resources, however as mentioned previously these should be relatively easily upgraded through infill drilling, with Indicated Resources likewise being upgraded to Measured.

Figure 13: NSP production target and resource category



Source: Diatreme

- Tables 7 and 8 present the capital and operating costs estimates - we have reviewed and compared these with other similar projects (including heavy mineral sands), and our view is that they are reasonable.
- Given the previous work on the GSP, we would view the accuracy more akin to the +-20% for a PFS, rather than the +-35% as quoted.

Table 7: NSP capital cost estimates

NSP capital cost estimates			
Item	**3 Mtpa**	**5 Mtpa Expansion**	**5 Mtpa**
Mining	Equipment Leased	Equipment Leased	Equipment Leased
Processing	$ 93,500,000	$ 23,600,000	$ 117,100,000
Common Services	$ 8,900,000	$ 400,000	$ 9,300,000
On Site Infrastructure	$ 61,900,000	$ 1,800,000	$ 63,700,000
Off Site Infrastructure	$ 78,300,000	$ 97,600,000	$ 175,900,000
Pre-Production Cost	$ 9,700,000	$ 7,000,000	$ 16,700,000
Owners / Indirect Cost	$ 56,900,000	$ 25,300,000	$ 82,200,000
Subtotal	**$ 309,200,000**	**$ 155,800,000**	**$ 465,000,000**
Contingency	$ 46,400,000	$ 23,400,000	$ 69,800,000
Total	**$ 355,600,000**	**$ 179,200,000**	**$ 534,800,000**

Source: Diatreme

Table 8: NSP operating cost estimates

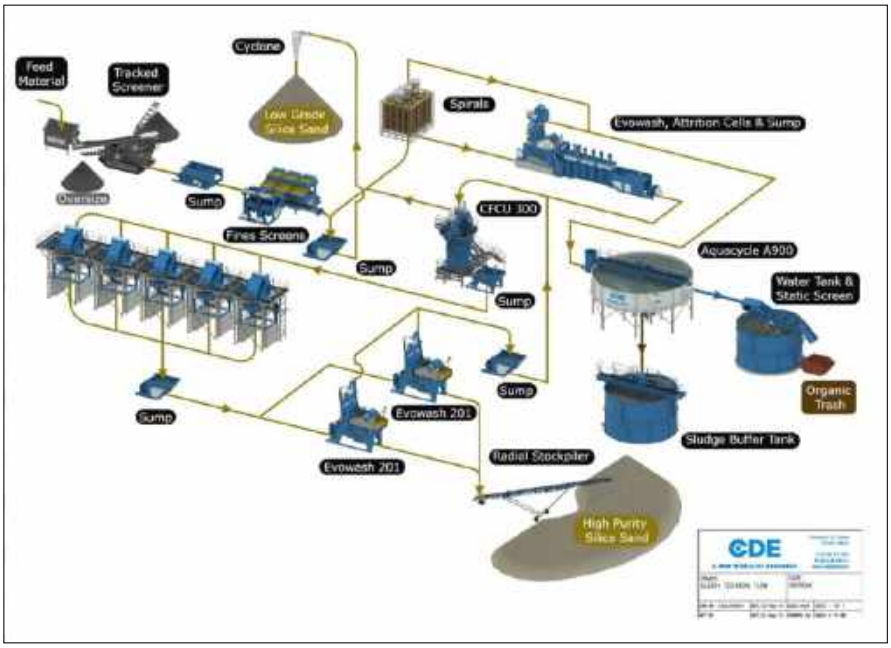
NSP operating cost estimates						
Item	**3 Mtpa**			**5 Mtpa**		
	AUD/y	**AUD/t Prod**	**AUD/t Ore**	**AUD/y**	**AUD/t Prod**	**AUD/t Ore**
Labour	$ 10,300,000	$ 3.43	$ 2.74	$ 12,000,000	$ 2.39	$ 1.91
Flights and Accommodation	$ 400,000	$ 0.08	$ 0.07	$ 400,000	$ 0.08	$ 0.07
Fuel	$ 4,100,000	$ 1.37	$ 1.10	$ 4,900,000	$ 0.97	$ 0.78
Maintenance	$ 8,900,000	$ 2.98	$ 2.38	$ 14,000,000	$ 2.79	$ 2.23
Reagents and Consumables	$ 200,000	$ 0.06	$ 0.05	$ 300,000	$ 0.06	$ 0.05
Equipment Hire/Lease	$ 26,500,000	$ 8.85	$ 7.08	$ 37,500,000	$ 7.49	$ 5.99
Transport and Logistics	$ 12,900,000	$ 4.29	$ 3.43	$ 16,000,000	$ 3.19	$ 2.56
Contract/General Expenses	$ 7,600,000	$ 2.53	$ 2.02	$ 7,700,000	$ 1.53	$ 1.22
Sustaining Capital	$ 7,400,000	$ 1.49	$ 1.19	$ 7,400,000	$ 1.49	$ 1.19
Total	**$ 78,300,000**	**$ 25.07**	**$ 20.06**	**$ 100,200,000**	**$ 19.99**	**$ 15.99**

Source: Diatreme

Planned Operations

- All land based activities will be company run and managed, with mining activities using leased equipment.
- Personnel will include a mixture of FIFO (generally skilled labour and management) and local labour, with the local personnel being bussed into site on a daily basis.
- The planned operation and material handling includes:
  - Removal of vegetation by dozer, which will be stockpiled off the mining areas for use in rehabilitation,
  - Mining of the sand by front end loaders, with mined material fed directly into hopper-feeder units, which will feed into mobile mining units ("MMU") located in the mining areas,
  - The MMU will screen out oversize and vegetation, with a 100 mm grizzly and then a 4 mm vibratory wet screen/trommel; and,
  - The undersize slurry will then fall into a sump, and then piped to the fixed silica processing plant ("SPP").
- The SPP will be a maximum of ~5 km from the MMU.
- The purpose of the SPP is to process the feed from the MMU, including to size (classify) and remove deleterious minerals, such as iron and titanium - as such the main components will include:
  - Feed receival and top size control (through screening),
  - Gravity beneficiation,
  - Attritioning (for cleaning),
  - Classification,
  - Reject sand removal; and,
  - Water services.
- The product will then be piped to the drying and stockpile area as a slurry (10 km), with drying, and then stockpiling through a stacker reclaimer, which will also be used for feeding a 6 km conveyor from the stockpiles to the port for shipping.
- Waste material (tails) is planned to be placed back into the mining voids and used in site rehabilitation - mining will be progressive, with rehabilitation being undertaken in parallel.
- A conceptual representation of the processing plant layout is shown in Figure 14 - note that this is from the GSP PFS, and thus the layout and number of processing trains will differ, and also shows a radial stacker adjacent to the plant, rather than a linear stacker 10 km from the plant.
- Major components will be modular, allowing for the ready upgrade to Phase 2, and for any future expansions.

Figure 14: Conceptual processing plant layout



Source: Diatreme

Metallurgy

- This is the critical technical aspect of the planned operation, with the requirement to consistently produce an in-spec product over a long period of time.
- As discussed, the main contaminants include:
  - Iron, predominantly as oxides coating silica grains, and in iron-titanium oxides,
  - Titanium, in iron-titanium oxides; and,
  - Aluminium oxide, generally in clay materials.
- The combination of spirals (which will remove the heavy mineral fraction, including Fe-Ti oxide) and attritioning (which will remove iron oxide and clays coating the silica grains) has been demonstrated to largely produce a product to meet the 120 ppm Fe_2O_3 threshold.
- Further treatment through magnetic separation has the potential to remove further iron, that may allow the product to meet premium specifications with <80 ppm Fe_2O_3 - <110 ppm has been achieved in test work to date (Table 9).
- Table 8 presents results of test work on four samples - three of these met the target Fe_2O_3 grade of 120 ppm, with 100 ppm or lower reached after magnetic separation, and were within required specifications for the other parameters.
- We note the high yields of over 90% in the bench scale testwork, however the Company has used potential yields of ~80% from the commercial scale equipment in modelling.
- The Company is investigating the cost/revenue trade-off in producing higher grade products as part of the metallurgical optimisation in the ongoing PFS.
- As a comparison, Figure 15 shows the specifications achieved for the GSP, which again produced in-spec material from the test work completed.

Figure 15: GSP product specification

Source: Diatreme

Table 9: NSP metallurgical characterisation summary

NSP metallurgical characterisation summary						
	Fraction	% wt	SiO_2	Al_2O_3	Fe_2O_3	TiO_2
		to feed	%	ppm	ppm	ppm
Sample 1	-710+106µm	96.4	99.5	1020	1220	1960
	gravity float (-2.7sg)	95.9	99.9	330	110	150
	attritioned product (+106µm)	95.6	99.9	310	100	140
	non-magnetic product	94.8	99.9	310	100	140
Sample 2	-710+106µm	95.2	99.5	880	1020	1600
	gravity float (-2.7sg)	94.8	99.9	350	130	170
	attritioned product (+106µm)	94.2	99.9	320	110	150
	non-magnetic product	93.3	99.9	310	100	150
Sample 3	-710+106µm	97.7	99.7	700	570	870
	gravity float (-2.7sg)	97.5	99.9	260	140	150
	attritioned product (+106µm)	96.9	99.9	260	120	150
	non-magnetic product	95.9	99.9	250	110	150
Sample 4	-710+106µm	97.5	99.6	800	860	1250
	gravity float (-2.7sg)	97.2	99.9	340	230	180
	attritioned product (+106µm)	96.3	99.9	310	200	160
	non-magnetic product	90.6	99.9	310	190	160

Source: Diatreme

Site Infrastructure

- The ancillary infrastructure will include those facilities typical of a remote minesite, including an accommodation village, offices, workshops and utilities amongst others.
- The utilities will include onsite power generation (with expected power usage of 7 MW for the 3 Mtpa operation, and 10 MW for 5 Mtpa), water bores and reticulation, and an on-site commercial sewage treatment plant.
- With regards to power, the Company is investigating various options and undertaking optimisation studies, however it is likely that generation will include a mix of solar and wind generation, with diesel generator backup.

Transport and Port

- The current NSP Scoping Study is predicated on using Cape Flattery, utilising barge transshipment for the Phase 1, 3 mtpa operation, and then extending the existing jetty and installing additional ship loading facilities for the 5 mtpa Phase 2 operations.
- However there may be the option to use the current facilities from the start of operations - as mentioned earlier Diatreme, Mitsubishi and Ports North have formed a working group to investigate shipping options for Diatreme's products.
- The Company initially plans to construct a rock wharf and associated roll-on roll-off (RORO) landing craft loading and unloading area, to be used during construction, and also for supplies during operations.
- This will then be equipped with a radial arm barge loader for the two years of 3 Mtpa production, to load barges used for transhipping to vessels moored offshore in the port area.
- Whilst the initial operations are underway, a 260 m extension is planned for the existing jetty, with Diatreme's conveyor system being extended, and a new ship loader being installed, to directly load 55,000 t Supramax vessels for export.
- As mentioned previously, there may be the option to negotiate the use of the existing infrastructure for the life of operation, which has the potential to save up to ~ A$150 million in up-front capital costs.

Sales, Marketing and Offtake

- The Scoping Study has been predicated on sales to Asia, largely China, with prices on a FOB basis.
- Although the Chinese buy material on a CIF basis, costs ex-Cape Flattery Port have been subtracted from the CIF price, with a product price of A$81/tonne being used in the Scoping Study.
- This pricing used in the modelling was based on the midpoint of 500-600 RMB per tonne PV HPSS CIFFO, and shipping and marketing costs of A$24/tonne.
- There may also be the potential to share offtake and marketing with Mitsubishi.

VALUATION

- We have undertaken a valuation of Diatreme, using a "sum of the parts" NAV method – this includes the projects and items as shown in Table 10.
- This is a base case valuation, and we would expect this to increase with material advances and project derisking.
- This highlights a robust project, with an NPV at a 2x multiple of the expected two phase capex of A$535 million, and with an IRR of 34%.
- We also have a maximum EBITDA of ~A$300 million, implying a valuation of A$1.5 billion using a 5x multiple.
- We have applied the current share structure for the per share valuation, due to uncertainties in what the final capex may be (including whether an agreement is reached to use the existing loading facilities at Cape Flattery) and what the final funding and ownership structure may be.
- The discounting, both the discount rate used, and the project multiplier, also provide some buffer against change in per share values due to dilution.

Table 10: Diatreme NAV valuation

Diatreme NAV valuation						
Item	**Tech Value**	**Equity Share**	**Risk Multiplier**	**Equity Risked**	**Per Share**	**Notes**
NSP	$1,062	73.2%	20%	$155	$0.042	NPV_{10}
WRA	$414	73.2%	10%	$30	$0.008	NPV_{10}
GSP	$341	73.2%	10%	$25	$0.007	NPV/Tonne
Exploration Targets	$2,462	73.2%	2%	$36	$0.010	NPV/Tonne
Cyclone	$120	100%	10%	$12	$0.003	2018 DFS
Clermont	$1.00	100%	100%	$1	$0.000	JV Terms
Head Office	-$16.11	100%	100%	-$16	-$0.004	NPV10
Cash (Not inc NSP)	$11.87	100%	100%	$12	$0.003	Actual
Cash (in NSP)	$30.00	73.2%	100%	$22	$0.006	Actual
Total	**$4,425**			**$277**	**$0.074**	
Discount Rate		10.00%	Shares (m)	3,730	HPSS Price FOB	**$81**

Source: IIR analysis

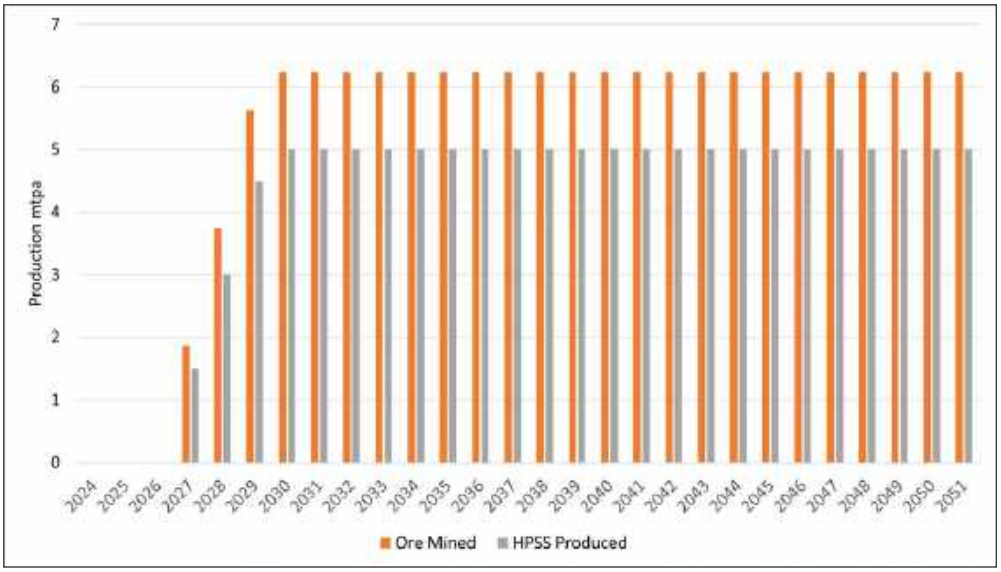
- In broad terms, should project ownership stay the same, and a 30/70 equity/debt mix be used, we could expect dilution attributable to Diatreme shareholders in the range of 1,100 million shares (no new port) to 1,800 million shares (new port as included in the Scoping Study).
- This implies a diluted per share value of between $0.049 to A$0.57/share using the current discount rate (10%) and risk multiple (20%) for the NSP, however an even modest derisking brings the diluted per share value to within reasonable agreement of the undiluted per share value as shown in our headline valuation.
- This also assumes capital is raised at A$0.05/share, significantly above the current price, but we would expect the value to improve on material advances in the Project, including completion of a positive PFS and then DFS, successful permitting, to have the Project shovel ready.
- Brief notes on the methods used to calculate the overall technical valuations include:
  - NSP - after tax DCF at a 10% discount rate, largely using inputs as provided in the Company Scoping Study,
  - GSP and WRA - we have used an NPV per resource tonne based on the results of the NSP Scoping Study, and multiplied that by the total resource (not reserve) tonnage,
  - Exploration targets - likewise, the NSP, NPV/tonne multiplied by the mid-point of the exploration target tonnage,
  - Cyclone - NPV as provided in the most recent development study,
  - Clermont - Diatreme equity value as determined by the MLM farm-in terms,
  - Head Office - NPV_{10} of pre-tax costs of A$1.5 million pa, over the life of the modelled NSP project; and,
  - Cash - both that which is 100% attributable to Diatreme, and not including that in the Sibelco JV, and the cash within the JV.
- We have applied the ownership to the relevant items, and discounted these to arrive at a discounted value attributable to Diatreme, with risk multiples determined due to the stage or type the relevant item:
  - A rule of thumb is that fully funded, approved and "ready to go" projects have a value of around 40-50% of their technical value or NPV - the 20% and 10% applied respectively to the NSP and GSP reflect the earlier stage, and also, in the case of the GSP, the potential of a higher permitting risk,
  - Although the WRA has a lower Resource confidence as the GSP, we have applied the same risk multiple, to reflect what may be considered a lower permitting risk for the WRA; and,
  - The 2% applied to the exploration targets again applies a rule of thumb, is that these can be valued at between 1% and 5% of NPV.

NSP DCF VALUATION

- This is an unfunded after tax valuation, largely using costs, prices and other inputs as used in the Company's recent Scoping Study - our view is that the figures used are reasonable, and within the accuracy expected of a study of this type.

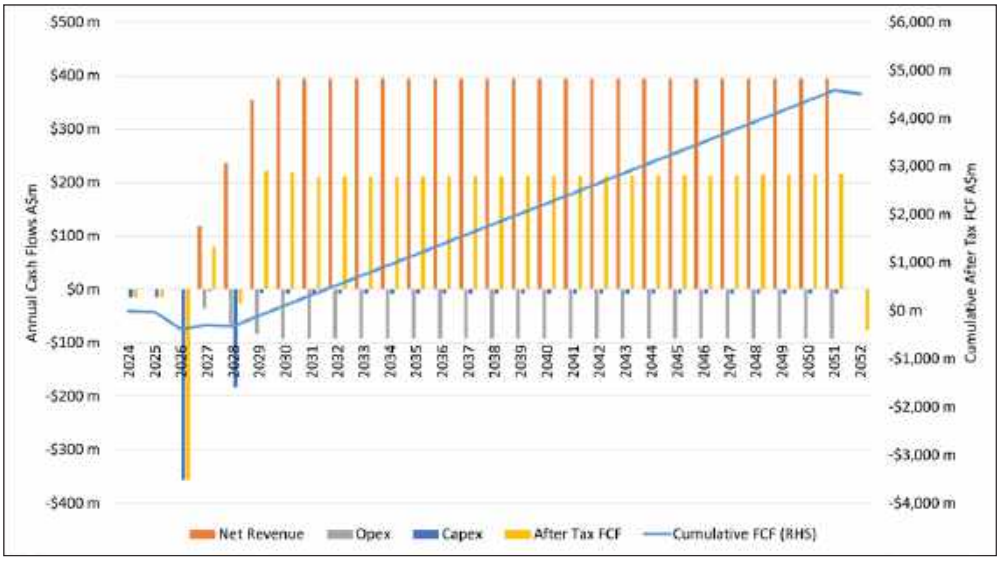
- As mentioned earlier we would expect it to be more accurate than the +-35% as quoted in the document, given the previous work on the GSP (to a PFS standard), and thus more akin to +-20% in accuracy.
- One difference in our modelling is that we have allowed for what may be considered conservative ramp-ups in production - we have allowed for 50% production in the first year of Phase 1 (1.5 Mtpa of product), and 50% of the difference between Phase 1 and Phase 2 in the first year of the Phase 2 production (therefore with production of 4 Mtpa).
- In reality these have a minimal effect on the overall valuation and project cash flows.
- Production and cash flow profiles are shown in Figures 15 and 16 - note that the cash outflows in the year after production ends represent tax paid.
- We have not included any significant mine closure costs.

Figure 15: Conceptual NSP RoM and product tonnages - IIR modelling (100% basis)



Source: Diatreme

Figure 14: Conceptual NSP cashflows - IIR modelling (100% basis)



Source: Diatreme

Sensitivity

- Table 11 and Figure 15 present the sensitivity of our NSP modelling to up to 20% changes in key parameters.
- These can be split into two groups - costs (capex and opex), and revenue (yield, production, price and exchange rates).
- Changes in the different revenue inputs should largely have the same effect on valuations and cash flows, however there will be some minor differences.

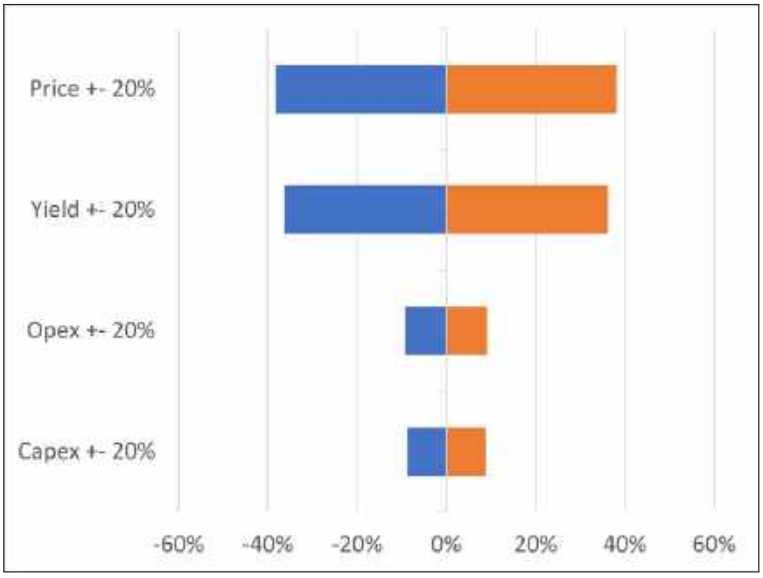
- However, there are generally significant differences between the effect of changes in capex (generally relatively low on a project NPV basis) and opex (generally high).
- Changes in capex will however have a magnified effect on a per share basis, given dilution due to having to raise additional equity.
- However, in the case of the NSP, the effect of changes in opex are reasonably low, given the relatively high margin of the project.
- The similarity to the effect of changes in capex is largely due to capex being upfront, with only limited discounting of costs in the DCF, whereas opex is consistent throughout the project life, and thus is more strongly discounted.
- What this analysis does is, however, highlight a robust project

Table 11: NSP NPV sensitivity - 100% basis

NSP NPV sensitivity - 100% basis				
Change	**Opex**	**Capex**	**Yield**	**Price**
-20%	$1,158	$1,154	$679	$657
-15%	$1,134	$1,131	$774	$758
-10%	$1,110	$1,108	$870	$859
-5%	$1,086	$1,085	$966	$961
0%	$1,062	$1,062	$1,062	$1,062
5%	$1,038	$1,039	$1,157	$1,163
10%	$1,013	$1,015	$1,253	$1,264
15%	$989	$992	$1,349	$1,365
20%	$965	$969	$1,445	$1,466

Source: IIR analysis

Figure 15: Conceptual NSP cashflows - IIR modelling (100% basis)



Source: IIR analysis

- We also measure the potential robustness of a project through the sensitivity analysis of coincident changes in inputs - in this case we have used product prices and operating costs, as shown in Table 12.
- This confirms a robust project, in that adverse 20% movements in both factors can be absorbed, and still result in reasonable returns.

Table 12: NSP NPV and IRR sensitivity - 100% basis

NSP NPV and IRR sensitivity - 100% basis						
		Change in Revenue Factors				
	NSP NPV_{10}	-20%	-10%	0%	10%	20%
Change in Operating Costs	-20%	$754	$956	$1,158	$1,360	$1,562
	-10%	$705	$908	$1,110	$1,312	$1,514
	0%	$657	$859	$1,062	$1,264	$1,466
	10%	$609	$811	$1,013	$1,216	$1,418
	20%	$561	$763	$965	$1,167	$1,370
	NSP IRR	-20%	-10%	0%	10%	20%
	-20%	27.5%	31.7%	35.8%	39.8%	43.7%
	-10%	26.4%	30.6%	34.8%	38.8%	42.7%
	0%	25.4%	29.6%	33.7%	37.8%	41.7%
	10%	24.3%	28.6%	32.7%	36.8%	40.7%
	20%	23.2%	27.5%	31.7%	35.8%	39.7%

Source: IIR analysis

BOARD AND MANAGEMENT

- **Mr Wayne Swan – Chairman:** One of only two Australian Treasurers to be named "Finance Minister of the Year" by Euromoney magazine, Mr Swan enjoyed a lengthy career in Australian federal politics, serving as Treasurer of Australia from 2007 to 2013 and Deputy Prime Minister of Australia from 2010 to 2013.

  During his parliamentary career, Mr Swan worked to improve legal recognition and protection for traditional owners, as well as supporting workers' rights and Australia's clean energy future.

  Since retiring from Parliament in 2019, Mr Swan has served as national president of the Australian Labor Party, Director of Stanwell Corporation, and Chairman (incoming) of CBUS (Australia's leading superannuation fund for the building, construction, and allied industries.)

  His qualifications include a BA(Hons) (University of Queensland).

- **Mr Gregory Starr – Non-executive Director:** Mr Starr is a highly experienced corporate leader in the resources sector, with over 25 years of executive management experience across a number of Australian and International companies. This includes roles as Managing Director of KBL Mining Limited (ASX), Managing Director of Crater Gold Mining Company Limited (ASX), President and Director of Kenai Resources Limited (TSX), Chief Executive Officer of Golden China Resources (TSX) and Managing Director of Emperor Mines Limited.

  Mr Starr has extensive corporate leadership skills and strong financial and business planning capabilities. This provides him with the capacity to manage the complete cycle of commercial activity, from strategy development, corporate financing, operational implementation and ongoing growth via organic means and/or acquisition.

  He has a Bachelor of Business from the University of Technology Sydney, and holds a Certified Practicing Accountant (CPA) qualification through Deakin University.

- **Mr Michael Chapman – Non-executive Director:** Mr Chapman is an experienced mining engineer with more than 40 years' experience in the development, engineering, construction and management of open-cut and underground mining projects in Australia and internationally.

  He recently served as the Chief Operating Officer of White Energy Company (ASX:WEC), following a similar role at Felix Resources, with previous employment at a range of operations across Australia and Indonesia and in commodities spanning coal, iron ore, copper and nickel.

  Mr Chapman's qualifications include a NSW Open Cut Coal Mine Manager's Certificate and a Qld Metalliferous Mine Manager's Certificate. He is fluent in English and Bahasa Indonesian.

- **Mr William Wang – Non-Executive Director:** Mr Wang has a finance major from The Chinese University of Hong Kong. For 15 years he held senior management positions in several major Chinese state-owned companies, with his most recent role being in charge of an international commodities trading arm with group assets exceeding $1.5 billion.

  Having worked across most provinces in China and understanding Chinese politics and government systems, he has developed wide business connections within China.

  Now domiciled in Australia, he has over recent years been active with Australian companies including directorships with China Century Capital Limited, Jupiter Mines Limited and Gulf Alumina Limited.

- **Ms Kara Keys – Non-Executive Director:** An experienced company director, Ms Keys has a strong board and financial background. Her financial experience includes previous roles as a trustee director at Cbus Super (Est. $54 Bn under management), energy provider Powerlink and asset manager United Super Asset Management and as a director of the Australian Institute of Superannuation Trustees.

  Her advocacy work includes having served as chair of peak women's organisation Women in Super, an NPO dedicated to improving women's retirement outcomes, together with being a director and principal consultant of KTL Collective, which works to build coalitions for meaningful change in First Nations communities.

  Ms Keys has worked closely with Indigenous communities, including serving for six years as a National Campaign Director and prior to that as the National Indigenous Officer at the Australian Council of Trade Unions.

- **Mr Neil McIntyre – Chief Executive Office:** Neil McIntyre is a highly experienced mining executive, with over 30 years of senior management experience at ASX-listed and other mining companies across Australia and the Pacific region, together with significant investment banking experience.

  Commencing in investment banking, his career spanned eight years as Managing Director of Pacific Capital Limited in Papua New Guinea, a boutique merchant bank owned at that time by NM Rothschild and Sons Australia Ltd, and several major PNG pension and superannuation funds which provided corporate and commercial advisory services with specialist expertise in the mining, petroleum and natural resource sectors.

  Mr McIntyre has been involved in the origination, financing and packaging of a number of resource companies in PNG and Indonesia including Belvedere Limited, a major copper/gold exploration project (Yandera Mine) in PNG subsequently sold to ASX and TSX listed Marengo Mining Limited and Indon Energi Limited, a PSC license holder in Indonesia and major holder of coal bed methane prospects jointly with PERTAMINA in Indonesia subsequently sold to ASX listed NuEnergy Capital Limited.

  He has held positions as Chairman, Executive Director, Director Finance and Non-Executive Director in various listed and unlisted minerals and petroleum exploration companies regionally.

  Mr McIntyre is a Member of the Australian Institute of Company Directors and in 2003 was made an ordinary member of the Civil Division of The Order of The British Empire ("MBE") for services to Commerce, Finance and Forestry in PNG.

- **Mr Tuan Do – Chief Financial Officer and Company Secretary:** A long-serving member of Diatreme's leadership team, Tuan Do has over 30 years' practical financial and management experience in a diverse range of industries, including the resources sector.

  This experience has involved all areas of financial reporting, treasury management, capital raisings, mergers and acquisitions, and establishment of systems and procedures.

  He has a degree in Commerce & Business Administration and is a member of Chartered Accountants Australia and New Zealand.

APPENDIX 1 - SILICA SANDS MARKETS

BACKGROUND

- Silica sand is a vital ingredient in a wide range of industries and applications, including, amongst others:
  - Glass,
  - Building products,
  - Foundry sands,
  - Fillers and extenders,
  - Chemicals; and,
  - Construction materials.
- Behind water, silica sand, with a global market of some 50 billion tpa (US$151 billion pa) in 2022, is the world's most consumed resource, being a vital ingredient in concrete and glass (and hence a key underpinning of the modern built environment), with resources now being harder to find in a time of rising demand.
- However "sand is not sand" - different specifications are required for different applications, with variables including grain size, sorting and purity amongst others.
- Diatreme is targeting the HPSS (high silica, low iron) markets, particularly for glass making, with Australia being a key supplier to the growing Asian Pacific markets, including China, Japan, Taiwan, South Korea, having exported some 4.2 Mt in 2022, including ~3.1 Mt from Mitsubishi's Cape Flattery operation.
- One issue with the markets are that they are not transparent, with, particularly in the HPSS market, price discovery being based on actual quotes from customers.

GLASS SPECIFICATIONS AND MARKETS

- One key use for HPSS is in PV glass in solar panels, a field that is forecast to grow strongly over coming years with the drive towards "renewable" energy sources - this is the market that Diatreme is targeting, and for which its sands largely meet the stringent specifications.
- However all glass markets in general require high quality sand, with both physical and chemical properties the keys to marketability, unlike construction sands, where physical properties are the key discriminant in applicability.
- Table A1-1 presents an example of specifications and markets (2019) for various glass types in the Pacific Asian markets (including PV glass), which all provide reasonable margin markets.

Table A1-1: HPSS glass uses and markets

HPSS uses and markets				
Use	**Spec - SiO_2**	**Spec - Fe_2O_3**	**Market in Asia**	**Growth in Asia**
Float (Plate) Glass	99.5% SiO_2	200 - 400 ppm	60 - 65 Mt	5% - 6%
Container Glass	99.5% SiO_2	300 - 500 ppm	70 - 75 Mt	5% - 6%
Cover Glass (Solar Panels)	99.5% SiO_2 & Low Fe	<100 ppm	5 - 6 Mt	+30%
Smart Glass (Ultra Clear)	99.5% SiO_2 & Low Fe	<100 ppm	1 - 2 Mt	5% - 6%

Source: VRX 2019 DFS, IIR analysis

PV HPSS MARKETS - DEMAND

- The Pacific Asian markets are the largest globally, producing, amongst others, some 50% of float glass and almost all of the PV glass - China produces 78% of solar panels globally, and as such is a key market for high specification HPSS.
- It is the PV HPSS demand that is forecast to grow the strongest, given the expected growth in demand for solar panels partly driven by legislative factors - the behaviour of the other glass applications can be considered more of a proxy for economic conditions.
- Overall, Asia produces some 93% of PV panels, with, at 6.4%, Vietnam being second behind China as shown in Table A1-2.
- Table 11 also shows actual and forecast annual solar panel production, and by inference, HPSS consumption in the manufacture of the panels; Figure 15 shows actual and forecast HPSS consumption out to 2030.

Table A1-2: PV markets and forecasts

PV markets and forecasts							
Country	Market Share - Current	2022 Actual		2030 10% CAGR		2030 15% CAGR	
		GW - 2022[1]	HPSS kt est[2]	GW - 2030	HPSS est kt	GW - 2030	HPSS est kt
China	77.80%	183.6	6,610	393.2	14,157	561.2	20,203
Vietnam	6.40%	15.1	544	32.3	1,165	46.2	1,662
Malaysia	2.80%	6.6	238	14.2	510	20.2	727
India	1.90%	4.5	161	9.6	346	13.7	493
United States	1.90%	4.5	161	9.6	346	13.7	493
South Korea	1.90%	4.5	161	9.6	346	13.7	493
Thailand	1.20%	2.8	102	6.1	218	8.7	312
Europe	0.60%	1.4	51	3.0	109	4.3	156
Taiwan	0.50%	1.2	42	2.5	91	3.6	130
Canada	0.40%	0.9	34	2.0	73	2.9	104
Singapore	0.30%	0.7	25	1.5	55	2.2	78
Japan	0.10%	0.2	8	0.5	18	0.7	26
Other	4.20%	9.9	357	21.2	764	30.3	1,091
Total	**100.00%**	**235.8**	**8,496**	**505.5**	**18,196**	**721.3**	**25,967**
Asia	**92.90%**	**219.2**	**7,893**	**469.6**	**16,905**	**670.1**	**24,124**

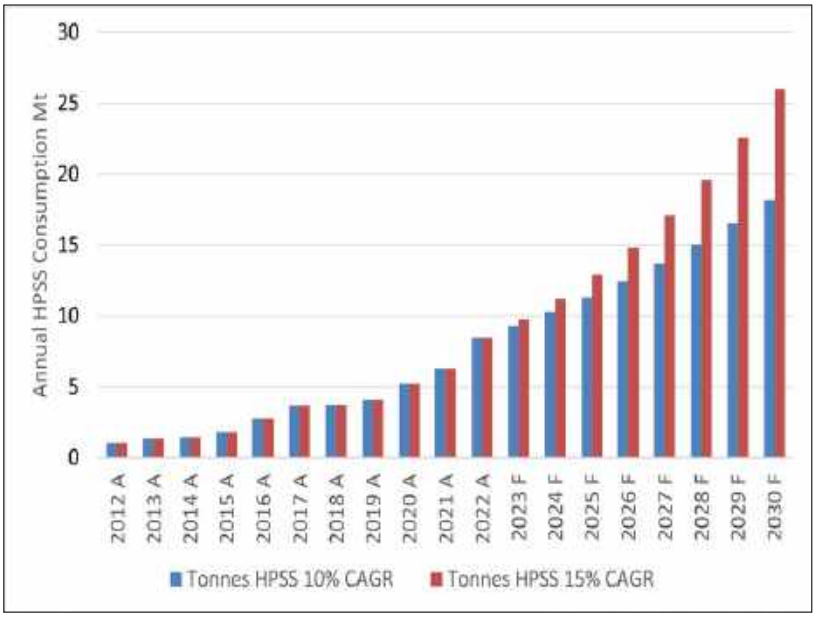
Source: IEA, IIR analysis

1: GW - new installed PV capacity in gigawatts

2: HPSS intensity = 36,000 tonnes per GW

- Here we have assumed that the production share stays stable, and forecast growth from actual 2022 figures (as published by the IEA) at 10% CAGR and 15% CAGR - these are broadly in line with recent IEA forecasts, with total PV installed capacity to be 5,025 GW by 2030 - this is in line with our accelerated case.
- The growth is presented in new installations of solar panels in GW, with silica sand tonnages based on an intensity of 36,000 tonnes per installed GW, or 50,000 tonnes of glass per installed GW with the PV glass containing ~72% HPSS.
- This results in a total increase in installed capacity of between 3 TW and 3.7 TW between 2022 and 2030, and total PV HPSS demand of between 106 and 135 Mt - total installed capacity in 2022 was, according to the IEA, 235.8 GW.
- Figure A1-1 shows estimated actual and forecast HPSS demand at the 10% and 15% CAGR growth rates.
- The figures that we have presented highlight the market opportunity.

Figure A1-1: Forecast PV HPSS demand



Source: IEA and IRR analysis

PV HPSS MARKETS - SUPPLY

- The main user of HPSS is China, with the country importing ~ 1.15 Mt of HPSS in 2022, with around 50% of this coming from Australia, and comprising some 18% of estimated total use of 6.5 Mt.
- The balance of demand (~5.5 Mt) is produced domestically, with a large proportion of this coming from crushed quartz, which is expensive, and environmentally unfriendly, including with a high carbon footprint.
- As shown in Table A1-2, China is forecast to require between 14 Mtpa and 20 Mtpa of HPSS by 2030, an additional 7.5 Mt to 13.5 Mt - this doesn't count the several millions of tonnes that may be required by other Asian markets listed in Table A1-1.
- It is doubtful that China will be able to grow its hard rock, acid-wash operations to cover the expected shortfalls in supply, and thus will be looking at increased imports to supply the solar panel industry.
- Another issue is that HPSS is a bulk commodity, and thus distance to ports and transport costs play a large part in project economics - here Diatreme is at an advantage, given the location adjacent to an exiting port.
- Australia is the ideal jurisdiction to feed into the expected supply shortfall, given location, and the projects that are looking to be developed.
- The estimated growth in demand should be sufficient to allow for full development of the NSP, as well as that planned by the other Australian developers.

GLASS MARKETS SILICA SAND PRICING

- As mentioned earlier, there is limited available pricing data, however publicly released development studies have some pricing.
- Prices are generally quoted in RMB on a CIF basis at a major Chinese port, with released studies by ASX-listed companies using an AUD FOB basis - this is arrived at by converting the RMB value to get an AUD CIF price, and then subtracting the estimated shipping cost to arrive at the AUD FOB price.
- DRX has used a CIF price of 500-600 CNY (US$78 to US$91) for PV HPSS, with a midpoint of A$81/tonne FOB using a shipping and marketing cost of A$24/tonne.
- In the 2019 Arrowsmith North DFS, VRX quoted a range of prices from A$54-79 FOB for a range of qualities, from F80 (80 ppm Fe_2O_3) down to F200 (200 ppm Fe_2O_3), also with different size distributions, however mostly within the 106µm to 600 µm range.
- MLM, in the 2023 Cape Flattery DFS has used FOB pricing of between A$75 and A$90.28/tonne, using real 2025 dollars for HPSS suitable for the PV markets - this has also used shipping costs of A$16/tonne.
- Prices used for PV HPSS in the various studies are all similar, with each of the companies either using external consultants to look at the marketing and prices, and/or visiting potential customers.
- Suvo, in a June 2021 presentation, presented the following prices, although the basis was not given:
  - Glassmaking - US$35 - US$53/tonne,
  - Foundry - US$38 - US$53/tonne,
  - Flour - US$90 - US$150/tonne; and,
  - AFS 60 - US$45 - US$70/tonne.
- If these are on an FOB basis, the glassmaking prices are in line with those from other sources.
- Note that Suvo has also included foundry sands - there is a range of specifications for these, largely relating to grain size distribution, designated using the "AFS" prefix.

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