

The ASX ANNOUNCEMENT logo, with a vertical orange line to the left of the text.

# ASX

## ANNOUNCEMENT

## QUARTERLY ACTIVITIES REPORT FOR THE PERIOD ENDED 31 December 2018

31 January 2019

### Quarterly Highlights

#### Projects

##### Cyclone Zircon Project, WA

- Positive Definitive Feasibility Study (DFS) results for Cyclone Zircon Project, undertaken by China ENFI Engineering Corporation (ENFI), show a robust and potentially highly valuable project with estimated NPV of A\$113m, internal rate of return of 27% and capital payback within three years
- ENFI, part of major Chinese mining group China Minmetals, formally endorses the Cyclone project and recommends immediate development.

##### Galalar Silica Project, Qld

- DRX's Nob Point silica resource renamed as Galalar Silica Project, with the support of traditional owners, Hopevale Congress
- Further drilling and sampling program completed in November 2018, with additional 30 holes drilled for over 699m and 699 silica samples obtained for further product testing
- Latest results demonstrate project capable of producing premium-grade silica product for export market.



## Cyclone Zircon Project – Positive DFS Shows Project’s Economic Potential

Diatreme Resources Limited (ASX:DRX) announced positive results from the Definitive Feasibility Study (DFS) for its flagship Cyclone Zircon Project, (**refer ASX release dated 15 November 2018**) which have slashed the project’s estimated capital expenditure and reaffirmed its potential profitability amid growing demand for high-grade zircon.

The DFS identified significant savings on previous project studies in the project development costs (capex), which are now estimated at \$135.7m, including significant contingencies, and with a rapid capital payback period post-production commencement of 2.7 years (life of mine estimate of 13.2 years). This compares to the AUD\$161m capex estimate provided in the 2016 study by independent engineering firm Sedgman (**refer ASX announcement 15 June 2016**).

The post-tax project NPV is estimated at \$113.3m using a 10% discount rate and base pricing assumption of US\$1,500 per tonne for premium zircon product. Current base prices for zircon are in the range of US\$1,580 (Iluka reference price as at October 2018) to US\$1,700 per tonne for current “spot” price purchases.

ENFI used a conservative evaluation method to ensure the DFS not only satisfies the needs of general investors, but also the exacting criteria required by Chinese financial institutions (banks and institutional lenders) and Chinese state-owned enterprise (SOE) companies within the sector for the purpose of immediate investment decisions.

### Executive Summary - Cyclone Project DFS Results

Diatreme engaged ENFI, through Cooperation and Consulting Services agreements, (**refer ASX announcement 11 January 2018**) for the completion of the Cyclone Zircon Project DFS. Under the agreements ENFI will also use its network within China’s state-owned enterprise and banking sectors to assist in sourcing potential project investors, offtakers and project debt funders. ENFI’s engagement was to review previous Cyclone studies, including the 2012 PFS and the 2016 Enhancement Study by Sedgman, and then complete the DFS.

ENFI adopted a conservative approach compared to previously reported study results for Cyclone. This has resulted in higher than Australian standards of projected working capital, sustaining capital, production ramp-up, and operating costs. This method is standard for a study to achieve bankable feasibility status with Chinese financial institutions and facilitates immediate funding options for potential Chinese investors.



In summary, Cyclone’s DFS has demonstrated the project capable of generating significant value for shareholders, due to its projected profitability, reduced capex compared to previous estimates and clear pathway to development.

#### Financial Results & Data (AUD\$)

Net Present Value	\$113.3m
Internal Rate of Return	27.2%
Payback period (production years)	2.7 years
Construction Capital (capex)	\$135.7m
Average Annual Revenue	\$130.1m
Average Annual operating expenditure (opex)	\$75.5m
Working Capital *	\$11.7m in Year 1
Sustaining Capital *	\$18.7m (\$10.2m in Year 1)
Average Annual Company Tax (30%)	\$11.6m
Average Annual After-Tax Profit	\$26.6m
Average Annual Depreciation	\$9.9m
Average Annual State Royalty	\$6.5m

*\*Note: Working capital and sustaining capital contingencies at \$11.7m and \$10.2m (\$21.9m total for first year) respectively for first year of operations are relatively high by Australian standards but compliant with Chinese bankable study standards. Removal or reduction of these contingencies could potentially enhance project returns and economics.*

Further details concerning the DFS are available from the ASX announcement released **15 November 2018**.

#### Cyclone Development – Next Steps

Following the release of the DFS, Diatreme has advanced its engagement with potential development partners with the assistance of ENFI, as per the “Cooperation and Consulting Services” agreement (refer ASX announcement 11 January 2018), with a goal of securing a major development partner(s) as soon as possible.

Diatreme has previously been in discussions with a number of potential HMC processing companies in China (**refer ASX announcement 27 June 2017**) who have current capacity to refine the HMC product. These discussions have been centred principally around the provision of “pure” product tolling arrangements.



Further to this, the Company has been in discussions with a major China-based party, an existing processor and refiner of heavy mineral products, to explore the potential for establishing a joint venture processing plant in China specifically to refine Cyclone's HMC product. This arrangement may also include direct investment by this party into Cyclone through a form of cross-ownership.

Diatreme aims to formalise those discussions through a Memorandum of Understanding, which may lead to more binding agreements. The Company will keep the market informed as these discussions progress.

On 23 January 2019, Diatreme announced the appointment of corporate advisory firm, Blackbird Partners, to support management and ensure maximum shareholder benefit from Cyclone's development. Blackbird have significant experience structuring mineral sands projects, including third party entry, financial modelling and advice on offtake strategy and development.

The Cyclone project has some natural commercial and market advantages that will assist greatly in this process:

- DFS now complete by China ENFI Engineering – showing robust economics
- DFS compliant with Chinese SOE and lender requirements
- ENFI's significant Chinese SOE contact base to assist in sourcing development partners
- Cyclone project has all primary project approvals in place – it is "shovel" ready
- Heavy minerals sector buoyant and potential zircon supply side shortage identified and acknowledged by market
- Cyclone product mix heavily zircon dominated – highest value heavy mineral product
- Project structure and ownership allows all development options to be explored, including development by Diatreme, joint venture, earn-in or project sale.

### **GALALAR SILICA/HMS PROJECT (QLD)**

In early December 2018 (refer ASX release dated 5 December, 2018) Diatreme announced the launch of the Galalar Silica Project (Galalar) following consultations with the traditional owners, Hopevale Congress.

The name change from the previous Nob Point Prospect (an area contained within the Cape Bedford exploration tenement) reflects the backing of Hopevale Congress and the Company's desire for maximum local economic benefit from the establishment of a new high-grade silica sand mine.



Galalar forms part of Diatreme's Cape Bedford Silica/Heavy Minerals Project, located around 200km north of Cairns and near the world's biggest operating silica sand mine at Cape Flattery.

### Further Exploration Activity

Diatreme has continued to advance the project, recently completing a program of additional drilling, exploration and testing during November 2018.

The drilling program undertaken with Diatreme's drill rig and crew comprised a further 30 aircore drilled holes for some 699 metres of total drilling, conducted as part of a program to increase the resource confidence through a staged progressive process.

An Unmanned Aerial Vehicle (UAV) survey was completed across the site to ensure accurate and recent topography data is used for all future resource calculations and checked against the topography used for the Inferred Mineral Resource calculations as a form of quality assurance.

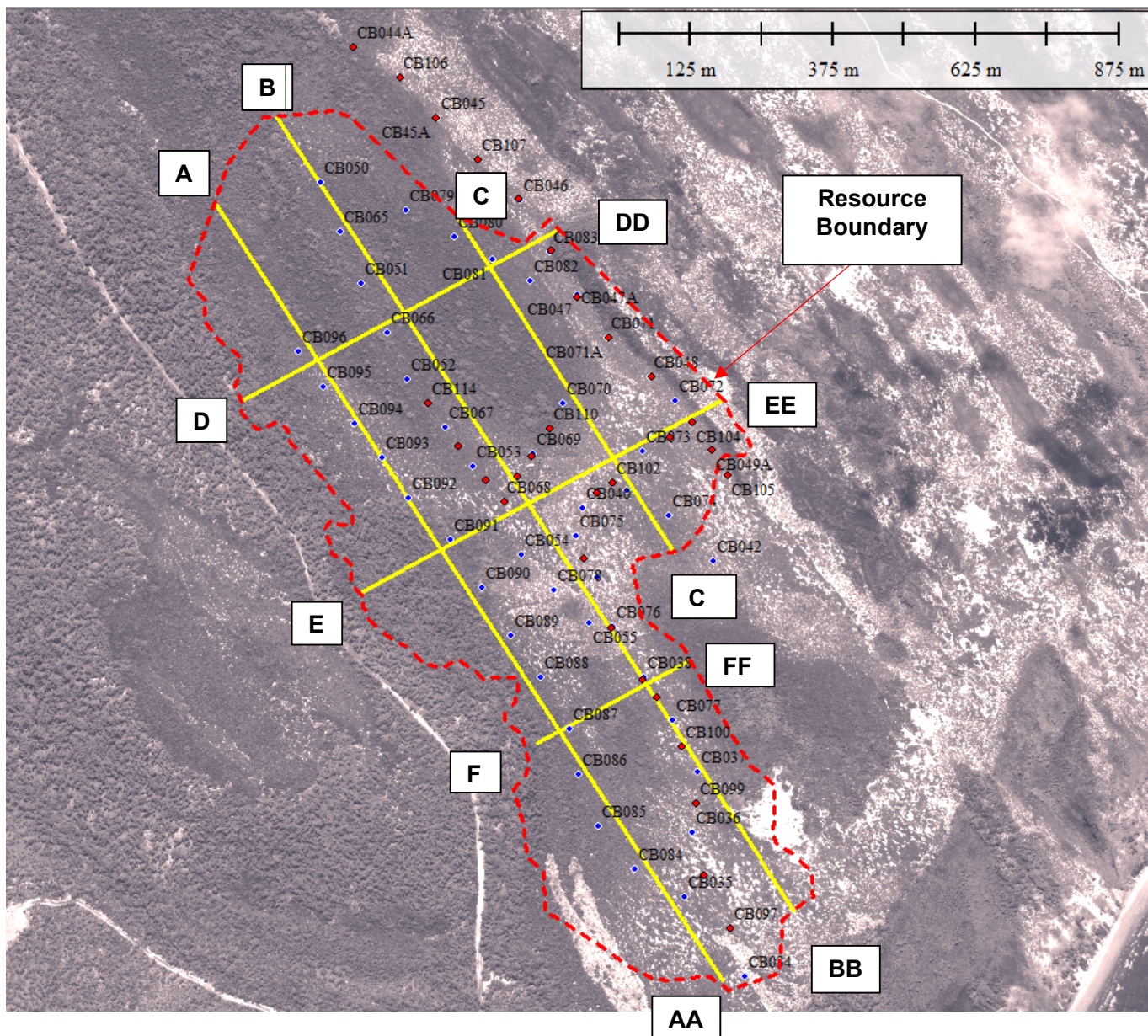
Drill space density trials were also completed to determine if 50 x 100m spaced drilling is adequate for a resource upgrade from Inferred to an Indicated level of confidence.

In addition, a number of holes were twinned from previous programs to:

- determine the adequacy of 3m composite samples for higher confidence resource estimation, and
- confirm the repeatability of drilling to better understand the continuity and repeatability of the air-core drilling technique.

Refer to the drilling map attached (**Fig 1**) with recent drilling points identified and detailed cross sections (**Fig 2**) of the resource deposition.

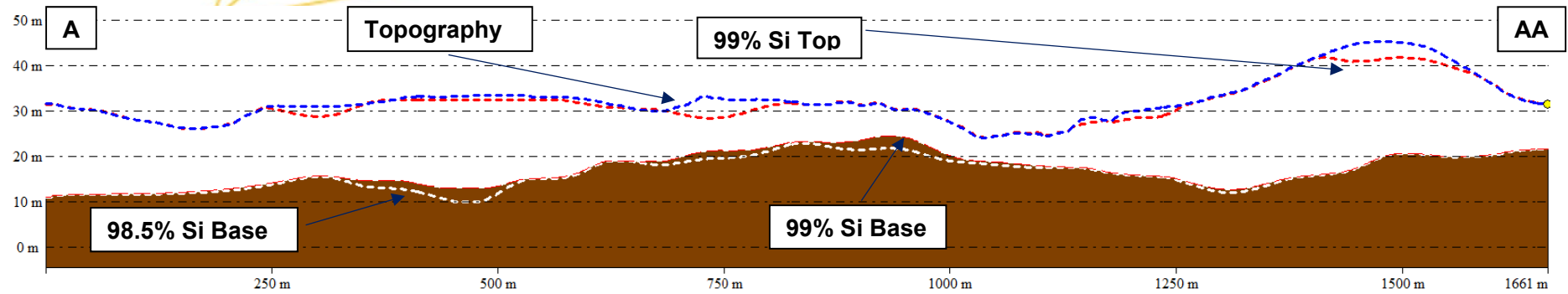
An extensive sampling program was undertaken at 1m drilling intervals, resulting in some 699 samples being prepared for further specialist testing. The purpose of the extensive sampling program was to obtain further high-quality information to confirm the in-situ silica purity, moisture levels, in situ bulk density and to further examine any geological deposition trends within the deposit.



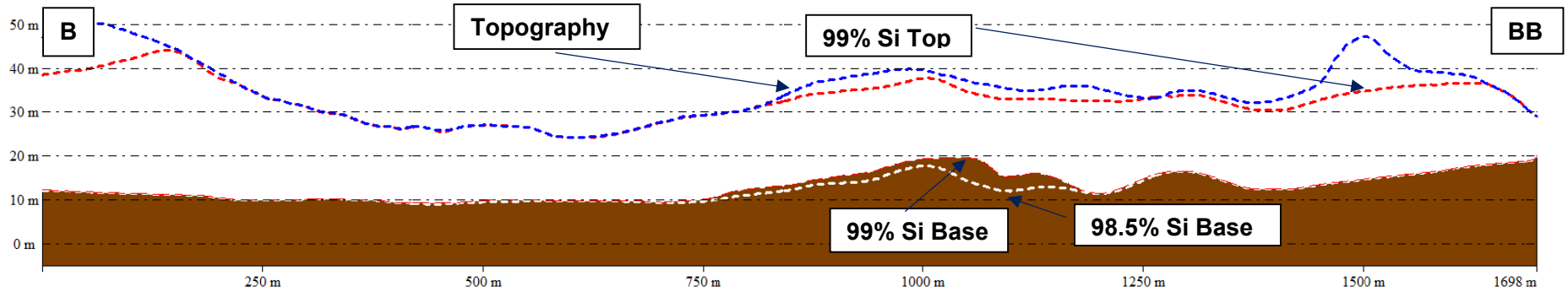
**Fig 1** – Note: **Blue** collars note previous drilling undertaken – **Red** notes November drilling program

**Fig 2 – Detailed resource cross sections**

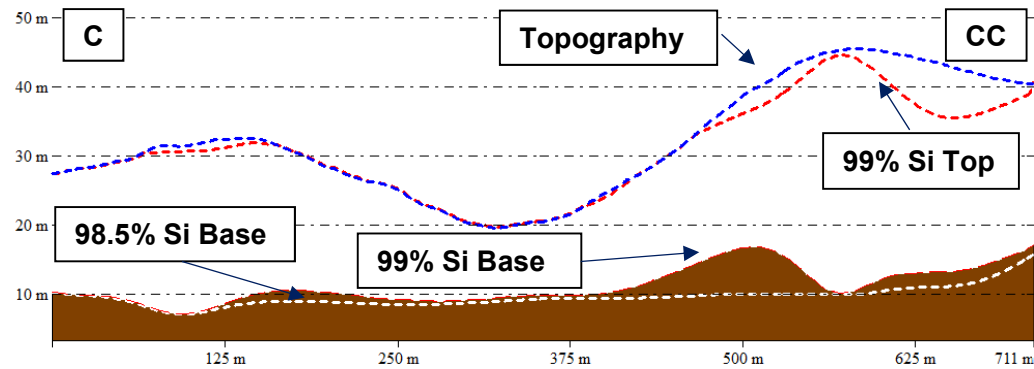
**Cross Section A-AA**



**Cross Section B-BB**

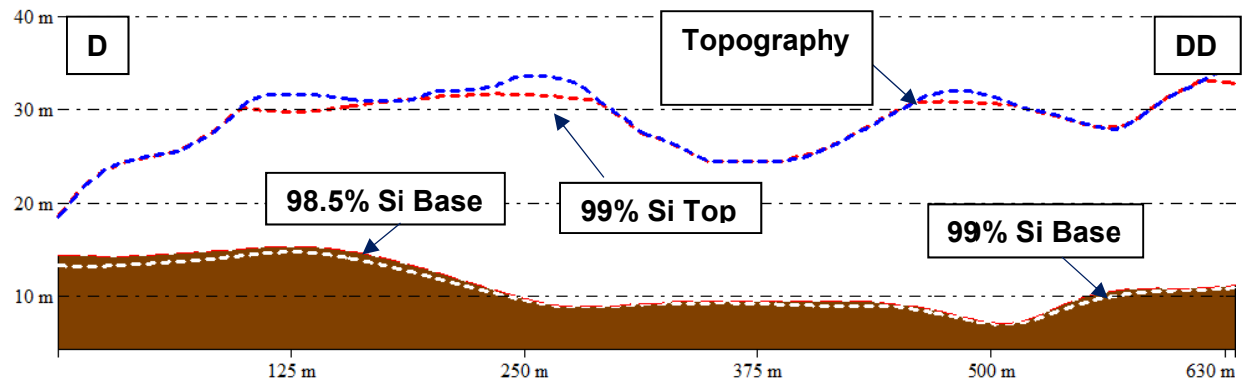


**Cross Section C-CC**

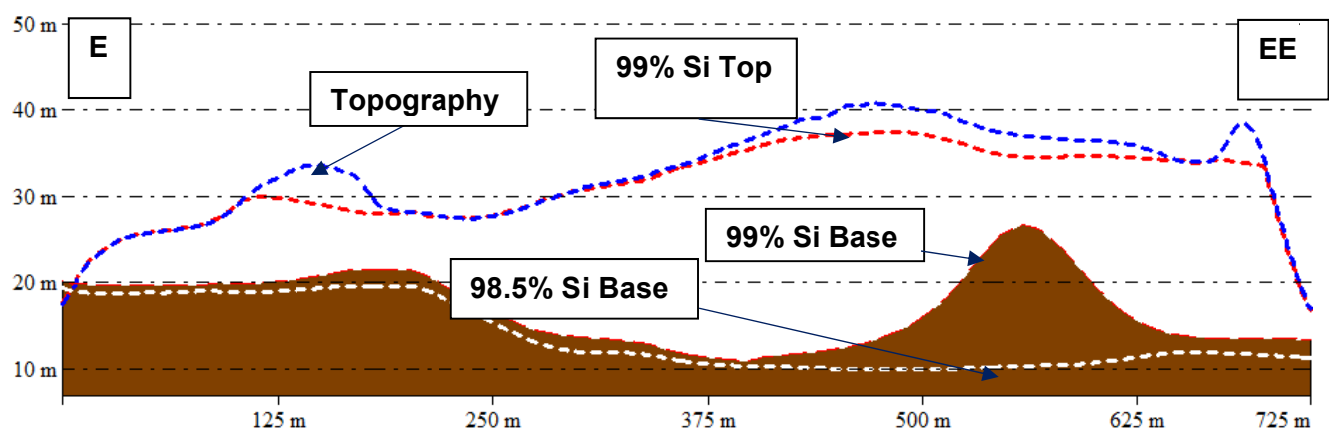




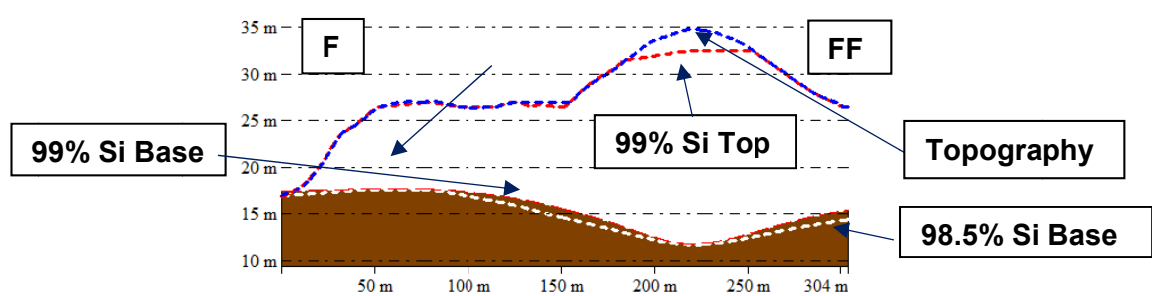
Cross Section D-DD



Cross Section E-EE



Cross Section F-FF





## **Hydrographic Survey**

Diatreme has engaged a specialist firm to undertake a detailed hydrographic study of the coast at Nob Point to identify water depths (at low and high tides) and allow preliminary concept designs to be undertaken regarding a suitable methodology for eventual product export.

These studies have identified a section of coastline within approximately 3km of the identified resource that should be suitable for construction of barging facilities (barge ramp), subject to more detailed commercial, permitting and engineering assessments.

Further specialist input will now be obtained to determine the potential construction costs associated with building this infrastructure so Diatreme can commence the process of more detailed project economic assessment.

## **Next Steps**

Diatreme is engaging with various regulatory and permitting agencies to design and scope appropriately the level of studies required, the permitting process and generate a realistic project implementation timeline moving forward.

This is being undertaken concurrently with further resource definition work and engagement with potential silica product offtakers to design suitable product specifications, pricing and delivery methodology.

Diatreme has identified potential high-tech applications, such as solar panel manufacture for the silica resource following meetings in China with a number of high purity silica sand end users and product sales agents.

On 9 January 2019, Diatreme announced bulk testing results had demonstrated the project is capable of producing a premium-grade silica product (<100ppm Fe<sub>2</sub>O<sub>3</sub> (low iron)), using standard processing techniques.

Excellent recovery rates were obtained from the final product of approximately 79% from raw sand feed. The test results also showed the potential to obtain secondary, high-value heavy mineral sands by product streams during mining, adding to the project's value.

The Galalar project is located in close proximity to fast-growing Asian markets, with the global silica sand market seen reaching nearly US\$10 billion in annual revenues by 2022, with a compound average annual growth rate of 7.2% (source: IMARC Group).



### **CLERMONT COPPER PROJECT, QLD**

Diatreme management and external consultants continue to review the Clermont Copper Project, particularly the Rosevale Porphyry Corridor, to determine its potential for further exploration or disposal.

### **TICK HILL GOLD PROJECT, QLD**

On 4 June 2018, Diatreme entered into a binding Terms Sheet with Carnaby Resources Limited and Superior Resources Limited, which grants Carnaby an option to acquire 100% of the Tick Hill Gold Project, located near Mount Isa, Qld (refer ASX announcement 5 June 2018).

Consideration for the sale comprises the issue to Diatreme of fully paid ordinary shares in Carnaby upon Carnaby's admission to the Official List of the Australian Securities Exchange via an Initial Public Offering (IPO).

Carnaby requested a further time extension and is expected to submit a revised purchase plan over the coming weeks. The Company will keep the market informed as this progresses.

Diatreme continues to review the project with the aim of securing maximum value for shareholders from this non-core asset, whether via Carnaby's IPO, farm-in or other divestment method.

### **CASH POSITION**

The Company's cash position at 31 December 2018 (Appendix 5B) was \$858,000.

**Dated 31<sup>st</sup> January 2019**

**Neil J McIntyre**

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## Annexure A - Mineral Resource and Ore Reserve Estimates

**Table 1. CYCLONE MINERAL RESOURCE AND ORE RESERVE ESTIMATE**

Category	HM cut-off %	Material Mt	HM %	HM Mt	Slime %	OS %	Head Grade						Zircon Kt
							Zircon %	Rutile %	Leuco %	HiTi %	Alt Ilm %	Si TiOx %	
CYCLONE MINERAL RESOURCE ESTIMATE													
MEASURED	1.0	156	2.4	3.81	4.2	5.0	0.69	0.07	0.16	0.58	0.30	0.53	1,079
INDICATED	1.0	48	1.9	0.89	4.4	5.1	0.38	0.04	0.09	0.62	0.30	0.34	183
TOTAL	1.0	203	2.3	4.70	4.2	5.0	0.62	0.06	0.14	0.59	0.30	0.49	1,262
Mineral Assemblage							27%	3%	6%	26%	13%	21%	
CYCLONE ORE RESERVE ESTIMATE													
PROBABLE		138	2.6	3.52	4.6	5.3	0.72	0.07	0.17	0.59	0.32	0.57	990
TOTAL		138	2.6	3.52	4.6	5.3	0.72	0.07	0.17	0.59	0.32	0.57	990
Mineral Assemblage							28%	3%	7%	23%	13%	22%	

### Table 1 Notes

- Rounding may generate differences in last decimal place
- A constant SG of 1.7 has been used to derive material tonnes
- Slime refers to material typically <53µm
- OS refers to material typically >2mm
- Mineral Assemblage derived from QEMSCAN® analysis
- Leucoxene (Leuc) – Ti-oxides containing 85 – 95% TiO<sub>2</sub>, HiTi - Ti-oxides containing 70 - 85% TiO<sub>2</sub>, Altered Ilmenite (Alt Ilm) - Ti-oxides containing <70% TiO<sub>2</sub>, Si-bearing Ti-Oxide (Si TiOx) – Ti-oxides containing >10% silica rich Ti minerals.
- “Strand”, “Beach” and “Nearshore” represent differing geological domains based upon varying sediment grain size and sorting (i.e. depositional environment), mineralogy and HM grade.

**Note:** The Cyclone Mineral Resource estimate was updated in January 2017, comprising 203 Mt at 2.3% HM (at 1.0% HM cut-off grade), containing 4.70Mt of HM. For full details refer ASX release dated 27 April 2017.

**Table 2. Cape Bedford Inferred Mineral Resource**

*Estimated In Situ Volumes of Resource @99%SiO<sub>2</sub>*

	Silica Sand (Mm <sup>3</sup> )	Resource Area (Mm <sup>2</sup> )	Average Thickness (m)	Density (t/m <sup>3</sup> )	Silica Sand (Mt)
<b>Total</b>	<b>13.5</b>	<b>0.83</b>	<b>16.3</b>	<b>1.6</b>	<b>21.6</b>


- It is anticipated that due to the nature of the assessment all of the 99% silica sand volume will be used as product and therefore will be included in the Resource assessment. As such, the estimated in situ volumes are equivalent to “Mineral Resources” as defined by the JORC Code (2012).
- In accordance with the JORC Code (2012) the classification of mineral resources is a function of the level of geological knowledge and confidence. With increasing level of geological knowledge and confidence the mineral resources are classified as “Inferred”, “Indicated” and “Measured Mineral Resources”. Both the geological knowledge and the level of confidence are a function of the complexity of the mineral resource and the amount of exploration/investigation carried out.
- Available exploration data for the Cape Bedford Silica Sand Project indicates that the sand mass has a relatively uniform lithological composition and its extent and volume can be relatively easily estimated using readily available topographic data sets. Based on available subsurface information and the reliability of the geological model, the calculated mineral resources, as shown in **Table 2** above, are considered as an in situ “**Inferred Mineral Resource**”.

**Note:** Refer ASX announcement dated 13 August 2018 for full details on the Inferred resource estimate for the Cape Bedford Project.

#### **MINERAL SANDS AND SILICA - COMPETENT PERSON STATEMENTS**

The information in this report that relates to Mineral Resources at the Cape Bedford Project is based on information compiled by John Siemon from Ausrocks Pty Ltd who has significant experience in Industrial Minerals and Quarry Resource assessments. John Siemon 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). John Siemon consents to the inclusion in the report on the matters based on their information in the form and context in which it appears.

The information in this report that relates to Exploration Results from the Cape Bedford 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 Sebrot 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, insofar as it relates to Mineral Resources at the Cyclone Project is based on information compiled by Mr Ian Reudavey, who was a full time employee of Diatreme Resources Limited and a Member of the Australian Institute of Geoscientists. Mr Reudavey has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he has 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 Reudavey consents to the inclusion in the report of the matters based on the information in the form and context in which it appears.

The information in this report, insofar as it relates to Ore Reserves at the Cyclone Project is based on information compiled by Mr Phil McMurtrie, who is a director of Tisana Pty Ltd (a consultant to Diatreme Resources Limited), and a Member of the Australasian Institute of Mining and Metallurgy. Mr McMurtrie has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he has 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 McMurtrie consents to the inclusion in the report of the matters based on the information in the form and context in which it appears.

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## APPENDIX 1

Appendix 1 provides information required under ASX listing rule 5.3.3 for mineral exploration entities.

### Mining tenements held at the end of the quarter and their location

State	Tenement	Tenement	Location	Interes	Holder	Comment
WA	Cyclone	M69/141	Eucla Basin	100%	LSPL	Granted
WA	Cyclone Extended	R69/1	Eucla Basin	100%	DRX	Granted
QLD	Clermont	EPM17968	Clermont	100%	CHAL	Granted
QLD	Cape Bedford	EPM17795	Hopevale	100%	DRX	Granted
QLD	Tick Hill	ML7094	Duchess	100%	DRX	Granted
QLD	Tick Hill	ML7096	Duchess	100%	DRX	Granted
QLD	Tick Hill	ML7097	Duchess	100%	DRX	Granted

### Mining tenements acquired and disposed of during the quarter and their location

State	Tenement	Tenement	Location	Interes	Holder	Comment
-	-	-	-	-	-	-

### Beneficial percentage interests held in farm-in or farm-out agreements at end of the quarter

State	Project Name	Agreement Type	Parties	Interest held at end of	Comments
WA	Cyclone Zircon Project	Farm-out Heads of Agreement	LSPL and Perpetual Mining Holding Limited	94%	HoA announced Jan 2014, initial 6% farm-out completed 18 Sept 2014
QLD	Tick Hill Gold Project	Farm-out and Joint Venture Agreement	DRX and Superior Resources Limited	100%	Proposed JV announced Aug 2011, formal Agreement announced Jun 2013, Joint Venture commenced Jan 2015, announced Jun 2018 sale to Carnaby subject to successful IPO



Beneficial percentage interests in farm-in or farm-out agreements acquired or disposed of during the quarter

State	Project Name	Agreement Type	Parties	Interest held at end of	Comments
-	-	-	-	-	-

Abbreviations:

M	Western Australia	Mining Lease	DRX - Diatreme Resources Limited
R	Western Australia	Retention Licence	CHAL – Chalcophile Resources Pty Ltd
EPM	Queensland	Exploration Permit for Minerals	LSPL – Lost Sands Pty Ltd
ML	Queensland	Mining Lease	