Exceptional High Purity Silica Results Achieved from Beharra Beneficiation Testwork

ASX RELEASE

24th February 2020
ASX: PEC

Silica Sand Project Portfolio

- Beharra
- Sargon
- Eneabba
- Eneabba North

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HIGHLIGHTS:

- *Beharra sand testwork continues to surprise to the upside with exciting potential for PEC to target a broad range of high value product markets*
- *Initial leaching and calcination testwork on Beharra sand reported up to **99.94% SiO_2 (99.992% SiO_2+LOI)** and further reduction of iron, aluminium and titanium*
- *Upcoming resource definition drilling across Beharra will provide further bulk samples for beneficiation studies*
- *Optimisation of both physical separation methods and leaching testwork to be undertaken based on air core drilling*
- *Size fraction analysis underway- initial product catalogue to be finalised upon receipt of results*
- *Product marketing based on initial test work underway*

Figure 1.Beharra Leach Residue Calcined Product, 99.94% SiO_2

Perpetual Resources Limited (**ASX: PEC**, "PEC" or "the Company") is pleased to report the results of the acid leach and calcination testwork conducted on silica sands from PEC's flagship Beharra Project.PEC's Managing Director, Mr Robert Benussi commented

"*Our aim with respect to the acid leach and calcination test work was to define the final product specifications for the Beharra Silica Sands Project.*

The initial test work has far exceeded our expectations and has broadened the range of products which can be potentially produced from Beharra.

Our aim is to build a sustainable business by targeting the broadest markets for silica sand, inclusive of the very large glass manufacturing industry. This test work has indicated that we can additionally produce high purity silica needed for specialist markets, this has exciting implications for where PEC may eventually sell its silica sand product suite."

Beharra Initial Beneficiation Testwork Overview:

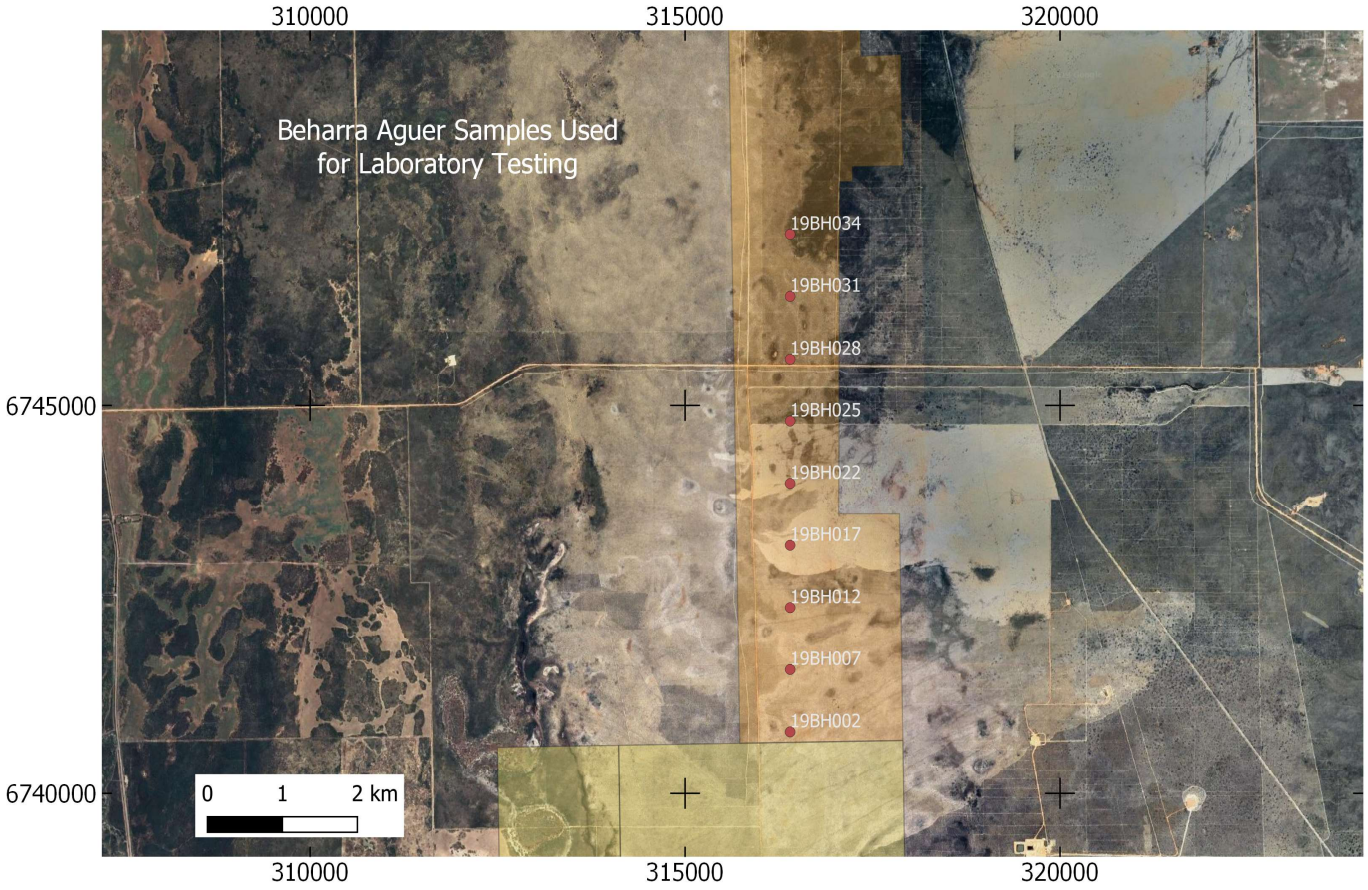

Figure 2. Location of augur samples used for calcination testwork.

Nagrom Metallurgical Laboratories ("Nagrom") was provided with a total of 9 auger drill holes samples from depth intervals of 0.5 to 2m and generated a single 178kg bulk composite sample of the material.

The auger drill holes were evenly distributed along the strike length of the prospective target area within the Vacant Crown Land portion of the Beharra Project. Refer to Figure 2 and Appendix 1. Organic contaminants were visually identified in these respective intervals due to the proximity to surface. It is expected that the samples obtained from the upcoming air core resource definition drilling program at greater depth will have less influence of organic content and which may lead to further improvement in purity results.

This first stage of laboratory testing was designed to establish responses to conventional processing methods, refer to figure 3. Further test work will provide a guide towards the final product specifications and end user applications.

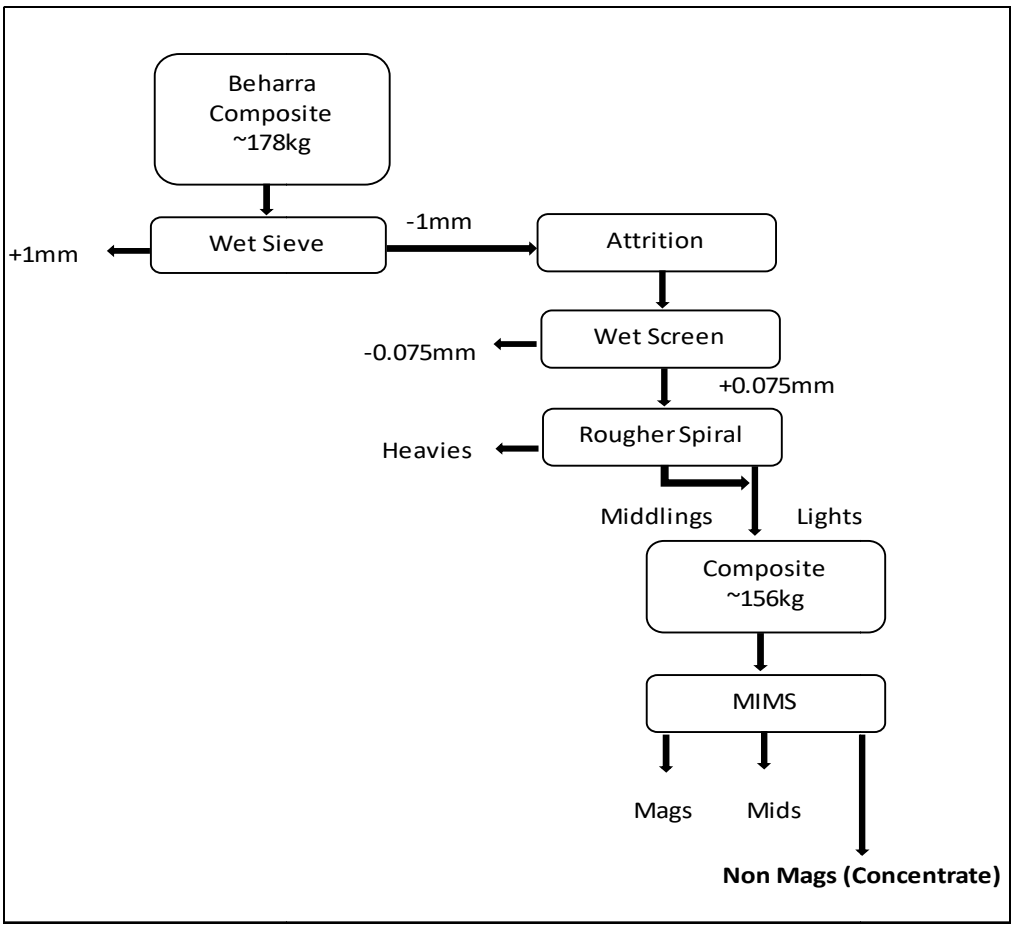

Figure 3: Beharra Initial Testwork Flowsheet

The sample was wet screened to -1mm then scrubbed in an attrition cell and wet sieved to remove -0.075mm material. This stage resulted in removal of approximately 2% of the feed mass demonstrating a very clean sand in- situ with little slimes present.

The +0.075mm fraction was spiralled and the middlings and light fractions were combined and passed over a medium intensity magnetic separator (MIMS). The non-magnetic fraction formed the final concentrate for this stage of testing. The recovery of the non-magnetic fraction was 99.1%.

The test work shows that the Beharra sand is very clean with minor slimes and that removal of heavy minerals by spiralling and magnetic separation is effective and applicable to the sand tested.

Confirmation of the clean nature of the sand was provided by petrology recently carried out on the non-magnetic concentrate; refer to ASX release "Beharra Silica Sand Petrology" 18th February 2020.

Table 1. Initial Testwork Results Beharra

Sample	Al_2O_3 ppm	CaO ppm	Fe_2O_3 ppm	K_2O ppm	MgO ppm	MnO ppm	Na_2O ppm	TiO_2 ppm	SiO_2 %	SiO_2+ LOI %
Raw Sample	2,500	30	1,270	350	170	0	110	1,690	99.15	99.37
Final Product	1,150	40	315	<100	50	<5	<100	350	99.85	99.89

Note: The final product assays for SiO_2 have been reported by difference. Difference is calculated by totaling the oxides of the elements that have been assayed and subtracting from 100%. Material prepped in Zirconia Bowl for analysis so has been excluded for SiO_2 calculation.

Further testing is proposed to be completed concurrently with the upcoming drilling program to define the potential of producing specialist products utilised for high end applications.

Beharra Leaching and Calcination Testwork Overview:

Acid leaching and calcification tests were conducted based on the treated silica sand MIMS non-magnetic product from Beharra using a variety of concentrations of sulphuric and hydrochloric acids. The samples were heated to 90ºC and acid leached for 6 hours. The leached solids were then pulverised andheated (calcined) to 1,000ºC for 1 hour, and then assayed.

The best leach result was achieved with a sulphuric acid only leach and resulted in a final SiO_2 grade of 99.79%, refer to figure 3. This sample was then subjected to calcination and this resulted in a final SiO_2 grade of 99.94%. These tests demonstrate the Beharra silica sands can be treated with conventional processes to produce a high purity silica dioxide product and with reduced aluminium and iron oxides levels.

A summary of leach-calcine tests is shown in Table 2.

Table 2. Acid Leach-Calcine results

Acids	Al_2O_3 ppm	Cao ppm	Fe_2O_3 ppm	K_2O ppm	MgO ppm	MnO ppm	Na_2O ppm	TiO_2 ppm	SiO_2 %	SiO_2 +LOI %
nil MIMS non-mag. conc.	1,150	40	315	<100	50	<5	<100	350	99.85	99.89
sulphuric only	650	30	130	<100	20	<5	<100	310	99.94	99.99
sulphuric + hydrochloric	470	35	125	<100	20	<5	<100	290	99.93	99.96
Note all tests conducted on MIMS non-magnetic concentrate and calcined after acid leaching										

Figure 4. Acid Leach sample 3 with a SiO_2 grade of 99.79.
After calcination the grade was improved to 99.94% SiO_2

Further Testwork:

Further testwork underway includes size fraction analysis of raw and beneficiated products. Once this has been completed, a comprehensive specification sheet and product catalogue will be prepared and will form the basis for initial discussions with end users and commencement of PEC's product offtake strategy

Upon obtaining representative samples from the upcoming resource definition drilling program, optimisation of screen sizing will be undertaken in conjunction with optimisation of the physical beneficiation methods (attrition, scrubbing, spirals).

Figure 5. MIMS Non Magnetic Concentrate

-ENDS-

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The information in this announcement that relates to the Exploration Results for the Beharra Project and is based on information compiled and fairly represented by Mr. Colin Ross Hastings, who is a Member of the Australian Institute of Mining & Metallurgy and consultant to Perpetual Resources Ltd. Mr. Hastings is also a shareholder of Perpetual Resources Ltd. Mr. Hastings has sufficient experience relevant to the style of mineralisation and type of deposits under consideration, and to the activity which he has undertaken, to qualify as a Competent Person as defined in the 2012 Edition of the Joint Ore Reserves Committee (JORC) Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr. Hastings consents to the inclusion in this report of the matters based on this information in the form and context in which it appears.

Appendix 1: Collar Table- Auger Drill holes

Hole	East_MGA	North_MGA	Depthm
19BH002	316,400	6,740,800	2
19BH007	316,400	6,741,600	2
19BH012	316,400	6,742,400	2
19BH017	316,400	6,743,200	2
19BH022	316,400	6,744,000	2
19BH025	316,400	6,744,800	2
19BH028	316,400	6,745,600	2
19BH031	316,400	6,746,400	2
19BH034	316,400	6,747,200	2

Appendix 2: JORC Tables

Section 1 Sampling Techniques and Data

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

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	• Sampling referred to in this announcement relates to samples that have been obtained from hand auguring to a maximum depth of 2m. • Three samples were collected from each hole being surface to 0.5m, 0.5m to 1.0m, and 1.0m to 2.0m. The top meter of the hole was split into 2 samples to allow a separate sample of the top 0.5m that contains organic matter associated with native ground cover. If sand mining operation were to be carried out this top 0.5m would be stockpiled for future rehabilitation, so at this time treating it separately is appropriate. • The shallow auger program was carried out to obtain representative sand samples to a maximum depth of 2m for in order to complete initial beneficiation testing of the raw sand product to define the final product specifications and overall recovery
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• Drilling consisted of a manually hand operated 75mm diameter sand auger (Dormer Sand Auger) with PVC casing utilised to reduce contamination potential as the auger is withdrawn from the hole. The auger was driven about 300mm then retracted and the sample was placed in a UV resistant plastic bag and this continued until the sample interval was completed. The sample was labelled with the drill hole number and sample interval, then placed in a second plastic bag and sealed and removed from site for logging and sample preparation.

Criteria	JORC Code explanation	Commentary
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• Each sample bag was weighed to determine the actual sample recovery, which resulted in an average sample weight of 7.5kg/meter of sample. • The type of sand auger used provided a clean sample with less possibility of contamination compared to a flight auger.
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	• The samples have been sufficiently logged including estimates of grain size, sorting and texture, and colour. Particular attention has been taken to ensure a more scientific and less subjective approach to colour has been adopted because colour (white to grey shades, and pale yellow shades) is one of the targeting features.
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• Samples were submitted to Nagrom Metallurgical Analytical Laboratories for drying, splitting, pulverization in a zircon bowl. A sub sample of 200g with a 75µm particle size is utilised for analysis. The sample preparation method is considered the industry standard for silica sands. Records were kept describing whether the samples were submitted wet or dry. • The auger holes were direct twins of previous auger exploration drill holes. • The sample size taken is appropriate for the sand being targeted.

Criteria	JORC Code explanation	Commentary
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	• • Samples were submitted to Intertek Laboratory in Maddington Western Australia. The assay methods for multi-element analysis consisted of four acid digest including hydrofluoric, nitric, perchloric and hydrochloric acids in Teflon beakers and analytes were measured using Inductively Coupled Plasma Optical (Atomic) emission spectrometry. Silica and other analytes were reported XRF+ICP methods. Intertek test code for these methods are 4ABsi/OE901 and FBI/XRF20 (for whole rock analysis). • Internal laboratory QAQC which includes duplicates, standards and blanks was utiilsed. • No geophysical tools were utilised for the process • A process of utilising duplicate samples and twinned holes has been implemented to ensure the level of quality controls required
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• Head grade composite results are in line with the global average grade from previous auger drilling. • All of the drill holes for the metallurgical testing program represent twin holes of previous auger drilling campaigns. • All primary information was initially captured in a written log, data entered, imported then validated and stored in a geological database • No adjustments to assay data have been performed.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• The position of the hole locations was determined by a GPS model Garmin GPS Map 64s with an accuracy of 5m. • The CRS used was GDA94/MGA Zone 50 • The topography at the project site currently under exploration is flat to gentle undulating terrain. Topographic control is presently via the GPS coordinates, a UAV survey is planned to be conducted to obtain a ± 50cm DTM across the entire project area.

Criteria	JORC Code explanation	Commentary
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• • The drill holes were spaced on an approximate 400m (east west) x 800m along strike (north south) grid. • The adopted spacing at this time is sufficient based on the geological continuity of the sand formation being tested, and sufficient to be applied in a resource estimation. • Sample compositing of holes has been completed using a length weighted average
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• The orientation utilised for the auger drilling campaign represents the entire strike length of the initial prospective target and as such is not expected to introduce any particular bias.
Sample security	• *The measures taken to ensure sample security.*	• All samples have been bagged and removed from site and are under the care of the contract senior geologist who will carry out the logging and sample preparation. • Samples were delivered to Nagrom Metallurgical Analytical Laboratories. The laboratory provided a sample reconciliation report which was audited against the sample submission sheet.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• None undertaken at this time

Section 2 Reporting of Exploration Results

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

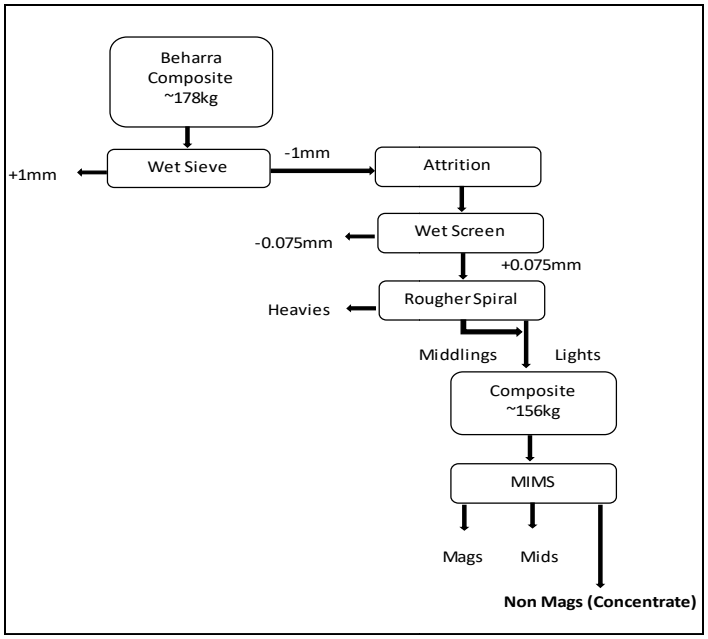
Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	• E70/5221 is currently live and in full force. • EL70/5221 was awarded on the 13th June 2019, comprising effective land area of 56.8km^2. The tenement is in the name of Peter Romeo Gianni. • The licence is currently being transferred to Perpetual Resources Limited in line with an option to acquire the tenement, refer to release dated 6th February 2019. • Located approximately 20km SE of Dongara, WA, 96km south of Geraldton. • The southern section of the licence area which is the current focus of exploration is covered by Crown Land. The licence area north of the Crown land is Freehold/Leasehold land • A 1% gross revenue royalty applies to the sale of all minerals from E70/5221 • 100,000,000 Performance Shares vest on the Company announcing an Inferred Mineral Resource in accordance with JORC 2012 Edition Guidelines of a minimum 50 million tonnes of white sands (at a minimum of 99% SiO_2) within the Project, or first shipment of a minimum of 20,000t of white sands (at a minimum of 99%SiO_2)
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Past exploration by others targeting heavy mineral sands. Refer to release dated 6th February 2019, historical exploration.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• Unconsolidated Quaternary coastal sediments, part of the Perth Basin. Aeolian quartz sand dunes overlying Pleistocene limestones and paleo-coastline.

Criteria	JORC Code explanation	Commentary
Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* ○ *easting and northing of the drill hole collar* ○ *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* ○ *dip and azimuth of the hole* ○ *down hole length and interception depth* ○ *hole length.* • *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	• Refer to table below for auger drill holes positions. Coordinates reported in MGA94-Zone50. • All holes were drilled vertically. • Collar RL's have not been recorded however the approximate RL across the area drilled varies from 28m to 32m determined from Goggle Earth images.

hole	East MGA	North MGA	detph m
19BH001	316000	6740800	2
19BH001D	316000	6740800	2
19BH002	316400	6740800	2
19BH003	316800	6740800	2
19BH004	317200	6740800	2
19BH005	317600	6740800	2
19BH006	316000	6741600	2
19BH007	316400	6741600	2
19BH008	316800	6741600	2
19BH009	317200	6741600	2
19BH010	317600	6741600	2
19BH011	316000	6742400	2
19BH012	316400	6742400	2
19BH013	316800	6742400	2
19BH014	317200	6742400	2
19BH015	317600	6742400	2
19BH016	316000	6743200	2
19BH017	316400	6743200	2
19BH018	316800	6743200	2
19BH019	317200	6743200	2
19BH020	317600	6743200	2
19BH020D	317600	6743200	2
19BH021	316000	6744000	2
19BH022	316400	6744000	2
19BH023	316800	6744000	2
19BH024	316000	6744800	2
19BH025	316400	6744800	2
19BH026	316800	6744800	2
19BH027	316000	6745600	2
19BH028	316400	6745600	2
19BH029	316800	6745600	2
19BH030	316000	6746400	2
19BH030D	316000	6746400	2
19BH031	316400	6746400	2
19BH032	316800	6746400	2
19BH033	316000	6747200	2
19BH034	316400	6747200	2
19BH035	316800	6747200	2

Criteria	JORC Code explanation	Commentary
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (egcutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• Length weighted averages of the entire 2m auger drill hole has been reported. No maximum or minimum grade cut offs have been applied. All results have been reported • The relatively consistent nature of the mineralisation means that the datasets are not affected by exceptionally high grade narrow intervals
Relationship between mineralisation widths and intercept lengths	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* • *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	• The high purity silica mineralisation is associated with aeolian dunes which are predominantly flat • It is expected that the vertical drilling intersects the silica sands on a true width of mineralisation
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• A map of the drill collars with calculated silica values is incorporated in the release of 10th April 2019.The drilling has not been conducted to sufficient depth to report meaningful drill intersections.

Criteria	JORC Code explanation	Commentary
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	• All assay results from auger drilling have been reported.

Criteria	JORC Code explanation	Commentary
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	• Metallurgical beneficiation testing studies have been described in the body of this release. First stage of preliminary laboratory test work has been completed as reported in this release. Analytes test method XRF Fusion with a 4 acid digest. • Test work has been carried out by Nagrom in Perth WA to establish responses to conventional processing methods. The sample used for this test work was a composite of sand from 9 previously drilled hand auger holes (February 2019) from interval 0.5m to 2.0m from each hole. Appendix 1 in this report is a table of the holes used. • A flowsheet of the metallurgical testing program is detailed below:  • Petrological and Mineralogical examination on two samples (non-magnetic concentrate and slimes after attrition scrubbing) carried out by Petrologist Paul Ashley using resin thin section for the non-magnetic concentrate. In addition, slimes and non-magnetic concentrate were examined microscopically on glass slides under oil immersion. • Acid leach and calcination test work was carried out by Nagrom in Perth. The MIMS non-magnetic concentrate was subjected to leach and calcination testing. The samples were leached at 20% w/w pulp density in 1M H_2SO_4 or 1M H_2SO_4/HCl solutions for 6 hours. • Calcination was undertaken at 1,000°C for 1 hour. Samples were pulverised before treatment. • Analytes test method XRF Fusion with a 4 acid digest.

Criteria	JORC Code explanation	Commentary
Further work	• *The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• Air core drill planning and permitting is underway in order to test the extents of high grade silica mineralisation. Further releases will be provided to market upon finalising drill plans.